

UNITED STATES DEPARTMENT OF COMMERCE

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# MONTHLY WEATHER REVIEW

JANUARY 1943

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**CORRECTION**

**MONTHLY WEATHER REVIEW, December 1942, vol. 70:**  
Page 272, the lithograph facing this page should be captioned, "*Percentage of Normal Annual Precipitation in the United States, 1942 (based on first-order stations).*"



# MONTHLY WEATHER REVIEW

Editor, **EDGAR W. WOOLARD**

VOL. 71, No. 1  
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JANUARY 1943

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## METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR JANUARY 1943

[Climate and Crop Weather Division, J. B. KINCER, in charge]

## AEROLOGICAL OBSERVATIONS

NOTICE.—Effective with the December 1942 issue, the publication of table 1 (RAOB summaries) was discontinued indefinitely.—EDITOR.

TABLE 2.—Free-air resultant winds based on pilot-balloon observations made near 5 p. m. (75th meridian time) during January 1943. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°). Velocities in meters per second

Altitude (meters) m. s. l.	Abilene, Tex. (538 m.)			Albuquerque, N. Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (870 m.)			Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burlington, Vt. (132 m.)			Charleston, S. C. (17 m.)			Cincinnati, Ohio (152 m.)			Denver, Colo. (1,627 m.)			El Paso, Tex. (1,196 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity			
Surface.....	31	309	1.8	30	264	1.8	25	243	2.7	27	268	2.7	30	330	2.6	26	131	1.6	26	134	1.2	26	313	1.0	29	306	0.8	28	258	1.7	28	232	2.3	31	294	1.2	31	266	1.0
500	30	288	1.5				25	244	4.1				29	311	4.4	26	128	1.3	23	179	3.1	17	248	3.3	28	279	5.4	24	272	13.5	12	276	10.0						
1,000	30	263	4.3				23	275	11.0				30	302	6.6	26	242	2.2	20	207	2.4	11	312	1.3	21	305	8.1	24	274	11.2	14	257	8.3	31	270	2.2	31	278	2.2
1,500	29	267	6.9	30	259	2.4	22	280	14.4	27	283	8.3	19	301	10.6	20	254	4.4	18	244	2.4				16	312	10.1	21	272	13.5	15	276	10.0	31	270	2.2	30	274	3.4
2,000	29	267	6.9	30	259	2.4	22	280	14.4	27	283	8.3	19	301	10.6	20	254	4.4	18	244	2.4				16	312	10.1	21	272	13.5	15	276	10.0	31	270	2.2	30	274	3.4
2,500	28	261	8.8	30	268	4.6	19	276	16.6	23	287	12.0	16	302	12.8	17	268	6.5	15	250	5.4				14	303	10.8	20	271	15.0	10	282	13.9	30	280	5.4	29	259	5.7
3,000	28	260	10.6	29	280	4.6	16	275	19.4	20	297	13.7	13	305	15.2	15	294	8.1	15	245	6.5				11	283	11.5	20	272	17.6				28	279	9.2	26	277	8.3
4,000	26	259	13.7	27	281	11.3	15	277	22.4	17	303	16.6	13	304	15.8	12	311	11.4	14	260	8.1				11	283	11.5	20	272	17.6				27	282	14.2	22	270	11.4
5,000	26	264	16.0	23	295	11.9	15	275	22.5	15	312	18.3	12	298	20.9	12	306	15.3	14	265	9.6				12	270	20.2						26	281	16.1	21	274	10.8	
6,000	24	261	18.3	22	294	11.3	11	281	25.1	14	307	20.2	11	300	17.5	10	309	19.1	13	268	12.5				11	275	22.2						25	288	18.7	17	275	12.5	
8,000	12	270	18.4	14	297	15.8													11	287	18.3												18	276	23.9	13	293	14.7	
10,000																																							
12,000																																							
14,000																																							

Altitude (meters) m. s. l.	Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,413 m.)			Greensboro N. C. (271 m.)			Havre Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Joliet, Ill. (178 m.)			Las Vegas, Nev. (573 m.)			Little Rock, Ark. (88 m.)			Medford, Oreg. (410 m.)			Miami, Fla. (15 m.)			Mobile, Ala. (66 m.)			Nashville, Tenn. (194 m.)			New York, N. Y. (15 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity			
Surface.....	31	319	0.7	30	323	1.3	23	240	2.9	26	257	2.5	29	220	0.7	24	287	2.2	31	60	1.8	31	256	2.3	21	354	0.7	30	121	2.4	25	225	1.8	29	238	2.3	28	309	3.2
500							23	240	5.6	26	254	5.2	29	248	3.1	24	283	2.9	31	303	1.0	28	264	5.2	21	353	0.6	30	106	2.7	24	253	2.0	29	230	4.3	28	285	5.2
1,000							23	246	8.2	26	273	7.4	27	251	5.6	21	285	5.6	31	70	1.6	28	264	5.2	21	192	2.1	26	175	0.6	23	283	3.4	28	240	6.0	24	285	7.5
1,500				30	317	1.4	22	243	11.2	26	273	7.4	27	255	7.9	18	281	9.5	31	303	1.0	26	274	7.6	20	219	3.8	25	219	1.6	21	290	6.9	21	265	12.1	22	283	9.7
2,000	31	309	1.1	30	317	1.4	22	243	11.2	26	273	7.4	27	255	7.9	18	281	9.5	28	296	1.9	26	268	11.2	17	246	4.5	18	244	3.1	21	277	8.9	19	271	13.5	13	296	10.4
2,500	31	309	1.1	30	317	1.4	22	243	11.2	26	273	7.4	27	255	7.9	18	281	9.5	28	296	1.9	26	268	11.2	17	246	4.5	18	244	3.1	21	277	8.9	19	271	13.5	13	296	10.4
3,000	27	308	3.3	27	256	4.9	21	276	16.6	24	297	13.1	24	264	10.7	16	287	11.9	26	284	2.5	22	268	14.0	12	246	5.4	17	250	6.4	16	279	13.0	15	278	18.4			
4,000	27	308	3.3	27	256	4.9	21	276	16.6	24	297	13.1	24	264	10.7	16	287	11.9	26	284	2.5	22	268	14.0	12	246	5.4	17	250	6.4	16	279	13.0	15	278	18.4			
5,000	23	310	7.8	22	282	9.9	15	272	26.6	24	297	13.1	24	264	10.7	16	287	11.9	26	284	2.5	22	268	14.0	12	246	5.4	17	250	6.4	16	279	13.0	15	278	18.4			
6,000	22	305	10.5	22	282	9.9	15	272	26.6	24	297	13.1	24	264	10.7	16	287	11.9	26	284	2.5	22	268	14.0	12	246	5.4	17	250	6.4	16	279	13.0	15	278	18.4			
8,000	20	298	12.2	11	290	11.4	11	269	32.1																														
10,000	18	308	13.3																																				
12,000	17	318	15.1																																				
14,000																																							

Altitude (meters) m. s. l.	Oakland, Calif. (8 m.)			Oklahoma City, Okla. (402 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (388 m.)			Rapid City, S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			St. Paul, Minn. (225 m.)			San Antonio, Tex. (240 m.)			San Diego, Calif. (15 m.)			Sault Ste. Marie, Mich. (230 m.)			Seattle, Wash. (12 m.)			Spokane, Wash. (903 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity			
Surface.....	28	257	0.5	28	343	1.6	27	280	1.8	31	128	0.4	28	360	3.9	28	297	2.7	27	286	1.4	30	140	0.4	28	256	2.7	23	315	1.9	24	318	0.2	25	248	1.1	24	21	0.3
500	28	61	2.1	28	309	1.2	27	275	2.4	31	107	0.8				28	290	3.8	27	296	1.9	30	221	0.6	28	230	1.7	23	303	2.7	24	212	1.7	25	217	1.0	24	253	1.6
1,000	27	22	1.3	24	258	2.3	27	271	4.7	31	115	1.3	28	359	4.0	24	267	5.0	24	276	5.4	29	253	1.0	26	164	0.6	21	293	4.4	19	214	2.8	25	217	2.0	20	238	7.3
1,500	25	5	1.6	27	285	5.3	24	281	7.5	31	183	1.0	28	298	6.8	25	285	6.5	22	280	9.2	28	254	3.4	25	303	0.4	13	284	3.6	17	229	2.6	16	217	4.3	18	271	12.6
2,000	22	341	3.1	26	278	7.5	22	278	10.7	30	227	1.1	27	299	10.8	20	290	10.4	15	275	11.6	26	249	7.8	21	316	3.6	11	271	5.8	14	288	6.3	15	279	18.7			
2,500	22	320	3.3	25	277	10.7	22	282	12.2	29	255	1.5	25	297	14.5	18	293	12.5	10	275	14.1	24	260	11.1	16	310	4.7	13	287	9.3				15	278	21.1			
3,000	21	328	4.9	24	274	12.5	21	280	14.0	29	275	3.7	23	303	16.0	18	286	13.6				18	260	13.2	16	340	5.0							14	277	25.5			
4,000	15	346	4.5	24	273	16.3	19	283	15.7	26	279	4.4	20	303	17.7	17	282	16.6				17	262	14.8	15	334	6.5							10	275	28.1			
5,000	13	10	4.2	23	272	19.4	16	280	19.0	23	291	5.3	16	297	18.4	16	282	18.6				15	264	14.8	12	304	9.9												
6,000	13	356	3.7	21	274	23.6	14	284	20.8	22	302	5.8	15	295	24.3	12	290	20.5																					
8,000	12	337	1.0	15	288	23.5				18	280	8.7	13	292	24.8							11	273	17.8															
10,000																																							

TABLE 3.—Maximum free-air wind velocities (m. p. s.), for different sections of the United States based on pilot-balloon observations during January 1943

Section	Surface to 2,500 meters (m. s. l.)				Between 2,500 and 5,000 meters (m. s. l.)				Above 5,000 meters (m. s. l.)						
	Maximum velocity	Direction	Altitude (m) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m) m. s. l.	Date	Station
Northeast <sup>1</sup>	46.8	nw.	1,550	21	Caribou, Me.	49.7	nw.	3,050	21	Portland, Me.	90.5	w.	13,550	29	Portland, Me.
East-Central <sup>2</sup>	46.8	wnw	2,500	4	Knoxville, Tenn.	62.4	w.	5,000	4	Greensboro, N. C.	69.0	sse.	8,210	13	Washington, D. C.
Southeast <sup>3</sup>	37.2	wnw.	2,500	10	Jacksonville, Fla.	48.0	wnw.	4,150	10	Jacksonville, Fla.	52.0	w.	8,030	20	Tallahassee, Fla.
North-Central <sup>4</sup>	45.6	w.	2,150	22	Rapid City, S. Dak.	53.4	wnw.	3,310	5	International Falls, Minn.	62.0	nnw.	7,120	11	Fargo, N. Dak.
Central <sup>5</sup>	49.2	sw.	1,580	15	Kansas City, Mo.	52.0	nw.	4,720	14	North Platte, Nebr.	75.2	wnw.	14,700	10	Wichita, Kans.
South-Central <sup>6</sup>	44.2	wnw.	2,160	9	Little Rock, Ark.	41.6	ws.	2,900	16	Texarkana, Ark.	113.0	sw.	17,090	23	Amarillo, Tex.
Northwest <sup>7</sup>	49.0	wnw.	1,260	15	Pendleton, Oreg.	60.0	wnw.	3,700	15	Burns, Oreg.	80.0	nw.	10,720	18	Boise, Idaho.
West-Central <sup>8</sup>	60.8	w.	2,480	20	Cheyenne, Wyo.	67.0	wnw.	4,700	15	Ely, Nevada.	70.0	nw.	12,920	18	Ely, Nev.
Southwest <sup>9</sup>	39.2	w.	2,370	16	El Paso, Tex.	42.6	wnw.	5,000	18	Albuquerque, N. Mex.	62.8	nw.	8,700	25	Tucson, Ariz.

<sup>1</sup> Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and northern Ohio.

<sup>2</sup> Delaware, Maryland, Virginia, West Virginia, southern Ohio, Kentucky, eastern Tennessee, and North Carolina.

<sup>3</sup> South Carolina, Georgia, Florida, and Alabama.

<sup>4</sup> Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.

<sup>5</sup> Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.

<sup>6</sup> Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and western Tennessee.

<sup>7</sup> Montana, Idaho, Washington, and Oregon.

<sup>8</sup> Wyoming, Colorado, Utah, northern Nevada, and northern California.

<sup>9</sup> Southern California, southern Nevada, Arizona, New Mexico, and extreme west Texas.

### RIVER STAGES AND FLOODS

By BENNETT SWENSON

Precipitation during January 1943 was extremely heavy in most sections west of the Rocky Mountains, while in the central interior sections of the country extremely dry conditions prevailed. Nevada and California had the wettest January since 1916, although parts of southern California were very dry during much of the month. Montana had more precipitation than in any January since 1909 and North Dakota, since 1933. On the other hand, Oklahoma, Missouri, Arkansas, and Iowa were the driest of record, Oklahoma having an average of only 0.08 inch during the month.

There were marked changes in temperature in January, alternating between very warm and very cold over much of the country. The mean temperature for the month was below normal across the northern third of the country and above normal in most of the remainder of the country.

Floods occurred during the month in California, Oregon, Nevada, and portions of the Southeast. The flood which originated during December in the Ohio River Basin, crested at Marietta, Ohio, on January 1 and reached the mouth of the Ohio by January 11.

*St. Lawrence drainage.*—Considerable snow has accumulated in the upper Lakes Region, the snow cover at the end of the month ranging from about 3 inches in southern Michigan to over 3 feet in northern Michigan and Wisconsin. The total snowfall for the winter season through January at Lansing, Mich., was about 47 inches, which represents more than the average total fall for the entire winter season.

A rise occurred in the Grand River at Grand Rapids, Mich., on January 17, due to an ice jam, but flood stage was narrowly averted.

*Atlantic slope drainage.*—The snow cover at the end of January extended as far south as Maryland and northern Virginia. Maximum depths of more than 3 feet were found in northern New York and New England. Ice in the rivers ranged from about a foot in northern Connecticut to over 2 feet in northern Maine. Mostly floating and shore ice were reported in eastern Pennsylvania, while in the Hudson River at Albany, 10 inches of ice was observed.

Heavy rains on January 18–19 and again on January 27–28, caused light to moderate floods in most of the streams from North Carolina southward.

Rains averaged about 2 inches over the Yadkin and upper PeeDee River basins on the 18th–19th and a moderate flood occurred in the PeeDee, cresting at 33.8 feet at Cheraw, S. C., on the 20th. On the 27th–28th an average of about 2.5 inches of rain occurred in the upper Yadkin Basin. This time Cheraw, S. C., crested at 34.7 feet on the 29th.

In the Santee River basin, average rainfall amounts in the two storm periods were as follows: Saluda River, 4.45 inches on the 18th–19th and 2.92 inches on the 27th–28th; Broad River, 3.32 and 3 inches; Catawba-Waterree River, 2.46 and 1.75 inches. Floods were mostly light with little damage resulting.

An average of 2.25 inches of rain in the Savannah River basin on the 18th–19th resulted in a crest stage of 33.3 feet at Augusta, Ga., on the 20th. Further rains on the 28th caused another slighter rise. Damage was light.

Sharp rises occurred in the upper Ocmulgee and Oconee Rivers from the heavy rains on the 18th–19th, which averaged 4.5 inches above Macon, Ga., and 3.4 inches above Milledgeville, Ga. Unusually heavy rains of over 7 inches fell at Hawkinsville and Dublin, Ga., in the middle portion of the basin, within 24 hours. The Oconee River crested at Macon on the 20th at a stage of 22 feet, 4 feet above flood stage, and the Ocmulgee River crested at Milledgeville on the same day at 28.4 feet, 8.4 feet above flood stage.

Another, but a lesser, rise occurred from the further rains on the 28th. However, stages in the lower reaches were already high and only slight rises occurred at the lower stations.

Flood stages were exceeded at all points in the Altamaha River system, except at Doctortown on the Altamaha. Slight damage was caused by the flood in the middle and lower reaches of the basin.

*East Gulf of Mexico drainage.*—Heavy rainfall from January 17–19, averaging 4 to 5 inches over northern and middle portions of the Chattahoochee River basin resulted in flood stages at all points south of Columbus and Montezuma, Ga. The Flint River crested at Albany, Ga., on the 22d at a stage of 32 feet, 12 feet above flood stage. At Eufaula, Ala., the Chattahoochee River reached



a crest of 48 feet on the 20th, 8 feet above flood stage. Considerable damage resulted from the overflow.

Slight flooding occurred in the middle Conecuh River from rains averaging 5.7 inches and moderate floods in Choctawhatchee River resulted from an average rainfall of 3.1 inches. The heavy rains fell on the 17th-18th. The damage from the flooding was moderate.

**Ohio Basin.**—The Ohio River flood which began during the latter part of December maintained moderately high flood proportions throughout the length of the Ohio River. Crest stages reached are given in the table of flood stages at the end of this report. A complete report of this flood will be given in a later issue of the REVIEW.

**The Great Basin.**—The following report is submitted by the Weather Bureau office, Salt Lake City, Utah, relative to storms and floods in Nevada:

An intense storm, which covered the entire State from January 20-23, was accompanied by high winds, and in northern, western, and southwestern areas by excessive precipitation. Due to unusually warm temperatures in the valleys and lower watersheds, much of the heavy precipitation came as rain or melting snows. Totals for the storm and maximum amounts in 24 hours were especially heavy in parts of the upper Humboldt, Carson, and Truckee Basins and at many other scattered points in northern and southwestern counties. Stations reporting 24-hour maximum precipitation exceeding 2 inches were as follows, in inches: Marlette Lake, 4.35; Lewers Ranch, 3.60; Carson City, 2.56; Reno Airport, 2.37; Minden, 2.32; and Goldfield, 2.10.

Rather heavy and destructive floods resulting from rapid run-off did considerable damage in the upper Humboldt Valley, especially near Elko, at many places in Washoe County, including the Truckee Basin, and also in the Carson Basin and in Humboldt County, near Orovada. The principal damage appears to have been from the washing out of highways, bridges, irrigation dams, and laterals. Important, but somewhat lesser losses were incurred by flooding and the interruption to communications and commercial traffic. The heavier losses appeared to have been incurred in Lyon, southern Washoe, and west-central Elko Counties. The total estimated losses for the State total about \$90,000, mostly from the action of floods, since wind damage apparently was quite minor.

**Pacific slope drainage.**—Unusually heavy rainstorms on January 19-23 caused considerable damage from flooding in both northern and southern California during the month. The Sacramento River rose above flood stage. At Sacramento, the maximum stage was 28.8 feet, compared with 28.5 in 1940. The heaviest rains occurred in the basins of the Bear and American Rivers and the high stage at Sacramento was due to the excessive run-off from the American River. The stages on the Bear and American Rivers were the highest since 1928, and in some cases the highest of record.

In Southern California, the rainfall on January 21 and 22 exceeded that of the March 1938 storm in some cases. However, very dry conditions prevailed prior to the storm of January 21-22 and the run-off was generally less than in 1938. Considerable damage was caused by the flooding in some cases, one instance being in Lytle Creek in the vicinity of San Bernardino.

Kings River, in the San Joaquin Basin, was at unusually low stages until the 22d of the month. Heavy rains at high elevations on the 21st caused a sharp rise in that river on the morning of the 22d, cresting at 16.2 feet at Piedra, Calif. Some lowlands were flooded but only minor damage resulted.

One of the worst floods of record occurred in the Eel River basin on January 20-23, the peak of the rise reaching Fernbridge, Calif., about midnight of the 21-22d. The crest stage was about 25 feet, compared to 24.4 feet in 1940 and about 25 feet in 1937.

A series of damaging floods began in the Willamette River basin in November and continued until the first part of January. November and December were unusually wet, the precipitation in the Willamette Basin

during the two-month period being 187 percent of normal.

Snow depths increased during the month in Washington, especially in the mountains, and were much above normal. In the northeastern part of the State, there has been snow on the ground at the lower elevations since November. Temperatures remained below normal and there was little run-off from melting snow.

The following report of the floods in the Sacramento River Basin was prepared at the Weather Bureau office, Sacramento:

The first 3 weeks of January 1943 were rainless and unusually cold. By January 19 the rivers of the Sacramento River district had fallen to very low stages. Rainfall was below normal at all points and the snow pack in the mountains was very light giving rise to considerable anxiety regarding a possible water shortage for the summer.

During the night of January 19-20, the first of a series of fronts moved inland over the district. Because of the cold air then present in northern California precipitation was in the form of snow down to very low elevations with reports showing as much as 16 inches on the ground at Redding by noon of the 20th. As cyclonic conditions increased, the continued inflow of warm air caused gradually increasing temperatures and by afternoon of the 20th precipitation was in the form of rain to moderately high elevations. The storm continued with increasing winds and high rainfall until the passage of an occluded front brought a temporary respite during the early evening of the 21st, but barometers continued at almost record low levels. A second series of frontal passages began early on the 22d and during that night moderately heavy rain occurred over most of the district. Rainfall for the storm period, at selected stations, is shown in table 1. This rainfall has been separated into two storm events, one of about 36 hours' duration from early morning of January 20 to the afternoon of January 21, and the other of 24 hours' duration from 7 a. m. January 22 to 7 a. m. January 23.

TABLE 1.—Precipitation at selected stations, January 20 to 23, inclusive

Station	Basin	January			Total	Percent of annual normal	Jan. 23	Percent of annual normal
		20	21	22				
Folsom	American	0.36	1.60	1.77	3.73	15.5	1.30	5.4
Pacific	do	.75	4.78	4.01	9.54	25.0	2.53	6.7
Georgetown	do	.58	2.01	2.25	4.84	8.8	1.87	3.4
Challenge	Yuba	.74	6.00	2.52	9.26	13.4	2.70	3.9
Camptonville	do	.70	5.70	2.47	8.87	14.4	3.08	5.0
Downieville	do	1.12	6.36	5.00	12.48	20.2	3.45	3.7
Oroville	Feather	.60	1.96	1.24	3.80	14.1	1.00	3.1
Bush Creek	do	1.40	6.65	3.35	11.40	16.5	4.20	6.1
Stirling City	do	1.00	6.08	2.40	9.48	13.8	4.25	6.2
Mineral	Deer	.95	5.45	3.25	9.65	19.7	2.58	5.3
Volta*	Battle	1.40	2.15	.72	4.27	13.6	1.95	6.2
Paskenta	Thomas	.50	1.71	.64	2.85	14.8	1.48	7.7
Stonyford	Stony	1.25	2.30	.87	4.42	23.2	1.36	7.2
Clear Lake	Cashe	.63	3.18	1.45	5.26	23.0	1.40	6.1
Hobergs	Putah	1.98	7.19	2.53	11.70	24.0	4.23	8.7
Dunsmuir	Sacramento	3.25	2.89	2.00	8.14	16.7	1.55	3.2
Vollmers	do	1.90	5.02	1.08	8.00	12.5	1.72	2.7
Red Bluff	do	1.10	1.93	.67	3.70	16.5	1.46	6.5
Hamilton City	do	.56	1.14	.61	2.31	11.7	1.15	5.8
Knights Ldg.	do	.38	1.40	1.05	2.83	17.1	1.18	7.1
Sacramento	do	.27	1.74	2.30	4.37	25.6	1.16	6.8
Benson's Ferry	Mokelumne	.35	.82	1.08	2.25	18.3	.96	6.5
Tiger Creek*	do	1.83	4.80	1.59	8.22	17.6	2.04	4.4
Salt Springs*	do	2.08	4.97	1.96	9.01	21.0	2.58	6.0

\*4 p. m. observations, all others 7 a. m.

It was the first of these two storm events that was most spectacular and most damaging. The severity of the rain is shown by the percentage of annual normal which fell within the 36 hours. Since precipitation during the first 12 hours was largely in the form of snow, the run-off from the storm was concentrated in a 24-hour period. At many river stations within the district the stages rose from the lowest to the highest for the month in little more than 24 hours, with some stations reaching near record crests (table 2). The storm which followed, resulted in a secondary crest at head-water stations and served to slightly increase the resultant crests at lower river points. No additional flooding or damage occurred as a result of the secondary peak.

The storms, traveling south of the more customary storm track, struck most heavily on the basins of the Bear and American Rivers. At Folsom, the American River reached a crest, exceeded only by the floods of 1907 and 1928, while at Wolf on the Bear River, pre-

TABLE 2.—Crest stages of important floods in Sacramento Basin.

Station	March 1907	January-February 1909	February 1915	March 1928	April 1935	February 1936	December 1937	February-March 1940	March-April 1940	February-March 1941	April 1941	January 1942	February 1942	January 1943	Highest of Record (to 1943, inclusive)
Kennett.....	33.2	32.5	29.5	23.0	14.0	21.8	29.0	36.3	23.1	17.4	19.7	18.3	20.9	-----	36.3, Feb. 28, 1940.
Vollmers.....	-----	-----	-----	-----	-----	-----	19.5	27.3	-----	-----	-----	-----	-----	-----	-----
Red Bluff.....	26.8	30.5	30.4	26.9	23.6	25.4	32.0	32.2	28.0	25.6	26.2	23.8	28.6	26.8	32.2, Feb. 28, 1940.
Tehama.....	220.0	-----	222.6	-----	-----	-----	-----	-----	-----	219.1	219.4	-----	221.4	218.6	-----
Hamilton City.....	-----	-----	-----	22.0	18.8	20.4	22.8	22.6	20.8	20.6	20.1	18.6	21.8	19.1	22.8, Dec. 11, 1937.
St. John.....	13.2	12.6	11.5	7.6	4.5	6.2	12.0	13.9	5.4	12.4	10.3	7.8	9.5	9.3	13.9, Feb. 28, 1940.
Ord Ferry.....	-----	-----	-----	-----	-----	115.4	121.0	121.6	119.1	119.0	118.8	117.1	121.2	118.1	-----
Colusa.....	29.3	28.0	28.8	25.7	25.6	26.0	26.8	29.5	26.2	27.1	26.7	25.9	28.6	26.0	29.5, Mar. 1, 1940
Knights Ldg.....	32.2	31.1	30.9	31.2	30.2	31.0	32.6	34.0	31.7	32.2	30.9	31.5	34.0	31.8	34.0, Mar. 1, 1940.
Las Plumas.....	493.0	489.0	-----	481.6	-----	471.7	481.0	479.4	478.0	472.6	-----	471.2	474.4	472.2	-----
Oroville.....	28.2	26.0	12.8	26.1	14.3	17.7	26.3	25.1	24.1	18.0	11.6	15.5	20.0	18.7	28.2, Mar. 19, 1907.
Colgate.....	23.0	19.5	7.2	21.0	11.0	13.0	22.0	14.8	15.3	12.8	4.7	12.2	12.5	17.7	23.0, Mar. 18, 1907.
Marysville.....	73.8	74.4	65.9	74.5	66.5	69.0	75.2	75.5	76.0	67.4	61.7	60.8	70.0	68.2	76.2, Dec. 11, 1937.
Nicolaus.....	-----	-----	18.9	23.2	20.5	21.2	24.6	26.3	25.6	22.9	19.4	21.9	25.1	22.0	26.3, Feb. 29, 1940.
Wolf.....	-----	-----	-----	13.8	-----	-----	10.3	-----	-----	-----	-----	8.2	9.0	14.0	-----
Rattlesnake Bridge.....	-----	-----	-----	-----	17.6	16.6	125.9	-----	21.5	-----	8.5	18.8	12.7	26.5	-----
Coloma.....	-----	-----	-----	-----	16.8	16.5	20.5	-----	18.1	-----	17.5	20.7	13.0	22.4	-----
Folsom.....	26.8	24.5	12.4	26.8	18.8	18.4	23.9	19.1	21.9	14.5	11.9	20.3	14.7	26.0	26.8, Mar. 19, 1907 and Mar. 25, 1928.
H St. Bridge.....	-----	-----	-----	43.4	39.0	29.0	41.9	39.2	41.6	34.5	-----	40.0	36.4	42.5	43.4, Mar. 25, 1928.
Sacramento.....	26.9	29.6	25.4	29.5	28.6	28.7	27.7	28.5	28.5	27.3	25.8	28.3	27.6	28.8	29.6, Jan. 17, 1909.
Michigan Bar.....	16.3	10.5	7.5	11.0	10.4	9.9	7.6	8.3	11.7	-----	-----	11.2	-----	-----	16.3, March 1907.
Benson's Ferry.....	14.5	-----	11.0	13.8	11.4	14.3	4.9	13.3	15.5	9.5	10.5	14.7	12.1	14.3	15.5, April 1, 1940.
La Grange.....	-----	-----	-----	9.3	5.3	4.5	-----	5.4	8.5	-----	-----	-----	-----	-----	9.9, Jan. 18, 1921.
Lathrop.....	19.2	18.7	12.9	16.4	12.8	15.3	5.2	14.4	16.6	15.4	11.8	7.1	10.1	-----	22.5, Feb. 1, 1911.*

\* Approximately.

\* 20.7, Mar. 17, 1938.

liminary reports indicate the crest may have exceeded that of 1928. At Wheatland on the Bear River a crest of 18.0 feet was reported to be 3 feet higher than any previous record. Elsewhere crests were not unusually high, in most cases ranking approximately as the seventh highest of the past 40 years. Unquestionably, however, it can be called the greatest flash flood of record during this century in the Sacramento Valley. On no other occasion has a flood of this magnitude developed from low water to crest in a period as short as 24 hours.

Damage was relatively light throughout the district. An important factor in conserving losses was the general warnings given to stockmen, permitting the removal of livestock from the bypasses and lowland areas, which, on account of antecedent low water were being more extensively pastured than usual in midwinter.

#### Overflow occurred as follows:

*East side Sacramento River from Red Bluff to below Hamilton City.*—Overflow normally occurs here nearly every year. The land is used primarily for grazing and little damage is reported.

*Reclamation District 1001 on the Lower Bear River.*—A levee break inundated a portion of this district requiring the evacuation of about 100 families. Damage was primarily restricted to dwellings and farm equipment. Red Cross workers from Yuba City and soldiers from Camp Beale rendered splendid service in evacuation of the flooded area.

*American River from the vicinity of Sierra Oaks to the mouth.*—The lowlands outside the Sacramento and Northern Sacramento levees were flooded. The damage was principally to dwellings and farm buildings. Damage was increased by the failure of a minor levee above H Street Bridge. The break did not increase the flooded area over what is normally covered at the stages which occurred but the suddenness of the break caused flooding before residents had ample opportunity to complete preparations. About 30 families were affected in this area.

*Liberty Island, Prospect Island, and Little Holland Tracts in Yolo Bypass.*—These farm tracts in Yolo Bypass are protected by substandard levees and flooding is expected whenever moderately high overflow occurs at Fremont Weir. The owners had ample warning and little damage was reported, except to levees and prospective crops.

#### FLOOD LOSS STATISTICS

1. Damage to tangible property, including buildings, equipment, land, roads, levees, etc.....	\$225,700
2. Damage to crops, actual and prospective, involving 18,650 acres.....	141,200
3. Value of livestock lost.....	500
4. Loss of income and suspension of business, including wages of employees.....	9,500
Total loss.....	376,900
5. Money value of property saved by flood warnings (incomplete estimate).....	31,000
6. No loss of life was reported, but it is believed that some lives were saved as result of warnings issued.	

Frequent and damaging floods occurred in the Willamette River and tributaries from November 23, 1942, to January 8, 1943. The Weather Bureau office, Portland, Oreg., submits the following report relative to the floods:

The rainy season began on October 30th when the first of a series of storms moved across Oregon. The storms became more intense by November 21, when a series of occlusions moved across the Pacific Northwest at intervals of about 24 to 36 hours, with frontal systems moving across on November 21, 22, 23, 24, 26, 28, 30, and December 1. The systems of November 28 and December 1 moved relatively slowly and were attended by widespread, warm-frontal rains over the Northwest. High pressure moved inland during December 2 and 3, but by the evening of the 4th pressures again began to fall over the Northwest, with the first of a family of systems moving across the Pacific Northwest on the 5th.

Successive systems moved inland over the Northwest on the 6th, 7th, 8th, and 9th and were again followed by high pressure, which spread over the western third of the country by the 10th. A weak trough passed over the Northwest on the 12th with rains limited to the region of the Cascades westward. High pressure dominated the western half of the map from the 13th to the 19th, causing the storm track to shift toward the north. On the evening of the 19th the first of a series of lows, with centers moving just north of Vancouver Island and occluding frontal systems extending southward to California, were noted.

Systems followed with a period of approximately 36 to 48 hours on the 20th, 21st, 23d, 24th, 26th, and 29th. The trough of the 29th moved slowly and was followed by secondary storms forming as waves on the discontinuity just off the Oregon coast on the 30th and again on the 31st. The last two systems formed directly off the Oregon coast and their attendant precipitation areas were widespread, warm, and heavy in amounts, especially from the Cascades westward.

High pressure accompanied by low temperatures moved inland on the 1st and 2d of January and stagnated over the Great Basin, bringing to an end an exceedingly stormy two months over Oregon.

August, September, and most of October were dry, and some new low-water records were established. Because of this the heavy rains which began on October 31 and continued at frequent intervals until January 2, required considerable time to bring any of the streams to flood stage.

November and December were unusually wet. For Oregon as a whole November was the second wettest of record and December the wettest of record, more than 47 percent of the year's precipitation having occurred in the 2 months. In this 2-month period the precipitation in the Willamette drainage basin was 187 percent of the normal. Including January 1, 1943, the average precipitation for stations in this basin was 32.59 inches. Precipitation at selected stations is given in table 3.

As previously indicated, the floods were not the result of a single outstanding storm, but of a prolonged wet period. At times melting snow in the foothills was a contributing factor, but at no time was there large run-off from high snow. Mountain snow storage at the



close of the flood period was unusually great for so early in the season.

In November the average river stages were the highest for several years at all stations in the basin, and the highest of record for November at several stations having relatively short records. In December the average was the highest of record for any month at Albany, Eula, Harrisburg, Jefferson, Leaburg, Salem, and Waterloo, and unusually high at other stations. Table 4 shows the crests reached at important stations, compared with the most recent equal or higher crests.

It is reported that 10 lives were lost. There was some loss of livestock and damage to roads, bridges, buildings, crops, and pastures. Erosion of farm and pasture land was serious locally. Considerable loss resulted from interrupted transportation, industry, and business.

TABLE 3.—Precipitation at selected stations in Willamette River Basin, Nov. 1942 to Jan. 1, 1943, and departures from normal

Station	River	Nov- ember	Depart- ure from normal	Dec- ember	Depart- ure from normal	Jan. 1	Total
Black Butte	Coast Fork	14.84	+ 6.11	18.40	+10.73	1.98	35.22
Saginaw	do	13.53	+ 7.66	16.30	+ 9.20	1.90	31.73
Rujada	Row	15.05	+ 8.95	15.04	+ 7.28	2.15	32.24
Star	do	12.64	.....	15.35	.....	1.84	29.81
Cascade Summit	Middle Fork (Nr.)	17.62	+11.38	15.69	+ 6.65	1.30	34.61
Eula	Middle Fork	16.42	+ 9.81	15.39	+ 8.55	2.35	34.16
Oakridge	do	12.56	+ 6.72	14.41	+ 9.59	.93	37.90
Westfir	do	14.54	.....	14.58	.....	1.90	31.02
Wicopee	do	18.33	+11.62	.....	.....	.....	.....
Leaburg	McKenzie	16.55	.....	17.69	.....	1.55	35.79
McKenzie Bridge	do	22.91	+10.70	23.94	+13.70	.....	.....
Monroe	Long Tom	15.25	.....	13.97	.....	1.24	30.46
Corvallis Water Bur.	Marys	21.80	.....	19.16	.....	1.23	42.19
Philomath (nr.)	do	14.16	.....	10.59	.....	1.36	26.11
Summit	do	20.76	+10.57	14.92	+ 4.51	1.98	37.66
Holley	Calapooya	15.56	.....	14.24	.....	1.46	31.26
Cascadia	Santiam	18.91	+11.60	14.89	+ 6.09	2.09	35.89
Detroit	do	27.76	+16.04	19.76	+ 9.82	2.80	50.32
Jefferson	do	14.14	+ 7.86	10.49	+ 3.72	1.55	26.18
Mehama	do	21.83	+12.93	15.50	+ 5.30	1.78	39.11
Waterloo	do	13.82	+ 7.69	11.36	+ 4.30	1.41	26.59
Falls City	Luckiamute	22.67	+10.26	18.98	+ 6.88	1.17	42.80
Suver	do	13.31	.....	9.90	.....	.....	.....
Molalla	Molalla	15.47	.....	10.36	.....	.....	.....
Sundown Ranch	do	21.56	+12.00	16.50	+ 2.83	.93	38.99
McMinnville	Yamhill	15.94	+ 8.54	12.25	+ 5.41	.66	28.85
Whiteson	do	17.24	.....	10.84	.....	.81	28.89
Willamina	do	16.61	+ 8.53	13.32	+ 3.31	1.16	31.09
Forest Grove	Tualatin	14.18	+ 6.44	11.17	+ 3.53	.....	.....
Spring Glade Acres	do	17.92	.....	13.99	.....	1.03	32.94
Cazadero	Clackamas	18.90	+11.60	13.21	+ 6.09	.....	.....
Three Links	do	21.53	+11.59	16.40	+ 7.24	2.72	40.65
Albany	Willamette	13.72	+ 7.00	9.99	+ 3.93	1.65	25.36
Corvallis	do	12.69	+ 5.77	10.37	+ 3.74	.50	23.56
Eugene	do	12.32	+ 6.43	12.34	+ 6.68	1.66	26.32
Harrisburg	do	16.71	+ 7.86	12.55	+ 5.44	1.20	30.46
Portland	do	14.40	+ 8.30	11.07	+ 4.35	.73	26.20
Salem	do	13.38	+ 7.49	11.70	+ 5.86	.17	25.25
Silver Creek Falls	do	21.91	.....	16.88	.....	.98	39.77
West Linn	do	18.61	.....	11.00	.....	1.00	30.61

TABLE 4.—Crest stages of floods in Willamette Basin and comparison with previous floods

Station and drainage	1942-43 crest		Most recent equal or higher crest	
	Stage	Date	Stage	Date
Willamette:				
Albany	30.6	Jan. 2	31.0	Nov. 24, 1909
Corvallis	28.1	do	.....	.....
Eugene	16.7	Jan. 1	17.0	Feb. 21, 1927
Harrisburg	17.1	do	.....	.....
Oregon City	18.3	Jan. 3	19.6	Jan. 9, 1923
Portland	20.2	do	23.6	Dec. 24, 1933
Salem	30.6	Jan. 2	31.0	Jan. 8, 1923
Coast Fork of Willamette:				
Saginaw	11.9	Dec. 30-31	12.6	Jan. 2, 1933
Middle Fork of Willamette:				
Eula	17.0	Dec. 31	17.0	Feb. 21, 1927
McKenzie:				
Leaburg	22.8	Jan. 1	.....	.....
Long Tom:				
Monroe	17.0	do	.....	.....
Santiam:				
Jefferson	21.3	do	17.5	Apr. 1, 1931

<sup>1</sup> Short record.

<sup>2</sup> Highest of (short) record.

<sup>3</sup> Fragmentary record.

<sup>4</sup> Based on former gage; equal to approximately 21 feet on present gage.

# FLOOD-STAGE REPORT FOR JANUARY 1943

[All dates in January unless otherwise specified]

River and station	Flood stage	Above flood stages— dates		Crest	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE					
Roanoke:	Feet			Feet	
Weldon, N. C.	31	Dec. 31	3	37.0	
Williamston, N. C.	10	4	11	11.1	
Tar:					
Rocky Mount, N. C.	9	20	21	9.1	2
Greenville, N. C.	13	22	25	14.1	2
Neuse:					
Neuse, N. C.	14	Dec. 31	2	15.2	
		19	22	16.8	
		30	31		
Smithfield, N. C.	13	1	4	14.5	
		19	24	18.2	2
		29	(1)		
Goldsboro, N. C.	14	22	29	17.4	
Kinston, N. C.	14	26	(1)	16.0	29-30
Haw: Moncure, N. C.	20	19	19	20.0	1
Cape Fear:					
Fayetteville, N. C.	35	20	21	36.9	20-21
		1	1	22.3	
Lock No. 2, Elizabethtown, N. C.	22	20	24	28.6	2
		30	(1)		
Pee Dee:					
Cheraw, S. C.	30	19	21	33.85	2
		29	31	34.7	29-30
Mars Bluff, S. C.	17	21	(1)	19.6	24-25
Poston, S. C.	18	26	(1)	19.2	2
Saluda:					
Pelzer, S. C.	6	18	21	8.5	1
		27	31	11.0	2
Chappells, S. C.	13	19	20	17.5	1
		28	30	22.2	2
Broad: Blairs, S. C.	14	19	21	20.2	2
		28	30	22.0	3
Congaree: Columbia, S. C.	19	19	20	19.4	2
Catawba:					
Catawba, N. C.	8	29	29	9.2	2
		19	19	11.9	1
Catawba, S. C.	11	29	30	15.2	2
Wateree: Camden, S. C.	23	20	21	24.8	2
Santee: Rimini, S. C.				16.2	2
Broad: Carlton, Ga.	15	18	19	19.6	1
		28	28	15.3	2
Savannah:					
Augusta, Ga.	32	19	21	33.3	2
		Dec. 30	1	23.5	(Dec. 31)
Butler Creek, Ga.	21	19	22	24.8	2
		29	31	23.3	2
Ogeechee: Dover, Ga.	7	23	(1)	8.8	2
Ocmulgee:					
Macon, Ga.	18	19	21	22.0	2
Hawkinsville, Ga.	25	22	25	27.0	2
Abbeville, Ga.	11	21	(1)	16.1	2
Oconee:					
Milledgeville, Ga.	20	Dec. 29	1	22.5	Dec. 30
		19	23	28.4	2
		28	30	23.9	2
Dublin, Ga.	21	22	27	25.0	2
Mt. Vernon, Ga.	16	23	30	19.1	2
Altamaha:					
Charlotte, Ga.	12	9	12	12.9	1
		23	(1)	21.5	2
Everett City, Ga.	10	30	(1)		
EAST GULF OF MEXICO DRAINAGE					
Chattahoochee:					
Columbia, Ala.	42	20	22	46.3	2
Eufaula, Ala.	40	19	21	48.0	2
Flint:					
Albany, Ga.	20	21	26	32.0	2
Bainbridge, Ga.	25	23	28	29.1	2
Apalachicola:					
River Junction, Fla.	20	22	25	22.0	2
Blountstown, Fla.	15	1	6	17.1	2
		20	(1)	21.9	2
		19	19	35.3	1
Conecuh: River Falls, Ala.	35	22	22	36.5	2
Choctawhatchee:					
Newton, Ala.	19	20	21	27.4	2
Geneva, Ala.	23	22	23	24.4	2
Caryville, Fla.	12	23	26	13.4	2
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Illinois:					
Morris, Ill.	13	Dec. 28	1	18.0	Dec. 28
Peru, Ill.	17	Dec. 28	6	21.1	Dec. 29
Peoria, Ill.	18	1	7	19.0	
Havana, Ill.	14	Dec. 31	17	16.7	5-
Beardstown, Ill.	14	Dec. 29	20	18.2	
Mississippi:					
Louisiana, Mo.	12	6	14	12.3	
Grafton, Ill.	18	Dec. 30	1	18.9	Dec. 31
Chester, Ill.	27	Dec. 30	4	29.6	
Cape Girardeau, Mo.	32	Dec. 31	4	34.4	

See footnotes at end of table.

## FLOOD-STAGE REPORT FOR JANUARY 1943—Continued

## FLOOD-STAGE REPORT FOR JANUARY 1943—Continued

[All dates in January unless otherwise specified]

[All dates in January unless otherwise specified]

River and station	Flood stage	Above flood stages— dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI SYSTEM—continued					
Ohio Basin					
Barren: Bowling Green, Ky.	Feet 28	Dec. 30	2	Feet 32.8	
Green:					
Munfordville, Ky.	28	Dec. 29	3	41.2	
Lock No. 6, Brownsville, Ky.	28	Dec. 30	4	37.8	
Lock No. 4, Woodbury, Ky.	33	Dec. 29	6	43.3	
Lock No. 2, Rumsey, Ky.	34	1	13	39.5	
Cumberland:					
Celina, Tenn.	28	Dec. 29	6	52.0	
Carthage, Tenn.	40	Dec. 30	6	50.0	
Nashville, Tenn.	40	Dec. 31	9	45.9	
Clarksville, Tenn.	46	3	10	49.4	
Eddyville, Ky.	50	1	13	59.0	
Tennessee:					
Bridgeport, Ala.	21	Dec. 30	2	24.3	Dec. 31
Florence, Ala.	18	Dec. 28	5	21.9	
Savannah, Tenn.	39	1	6	42.1	
Johnsonville, Tenn.	31	3	8	32.4	
Ohio:					
Marietta, Ohio	35	Dec. 30	4	48.8	
Parkersburg, W. Va.	36	Dec. 30	4	49.0	
Dam No. 19, Washington, Ohio	40	Dec. 30	4	51.5	1-2
Dam No. 20, Belleville, W. Va.	45	Dec. 31	4	51.6	
Dam No. 22, Ravenswood, W. Va.	44	Dec. 31	5	55.0	
Point Pleasant, W. Va.	40	Dec. 30	6	54.7	
Gallipolis Dam, Hogsett, W. Va.	35	Dec. 30	6	60.4	
Dam No. 28, Huntington, W. Va.	50	Dec. 31	6	60.1	
Dam No. 29, Ashland, Ky.	51	Dec. 31	7	63.4	
Dam No. 30, Greenup, Ky.	52	Dec. 31	7	63.2	
Portsmouth, Ohio	50	Dec. 31	7	61.2	
Dam No. 22, Vanceburg, Ky.	53	Dec. 31	7	61.2	
Dam No. 33, Maysville, Ky.	50	Dec. 31	8	60.4	
Dam No. 35, New Richmond, Ohio	48	1	8	57.4	
Dam No. 36, Brent, Ky.	52	1	8	61.1	
Cincinnati, Ohio	52	1	8	60.8	
Dam No. 37, Fernbank, Ohio	50	1	9	59.6	
Dam No. 38, Grant, Ky.	51	1	8	58.8	
Dam No. 39, Markland, Ind.	48	2	8	52.8	
Louisville, Ky. (upper gate)	28	2	9	35.7	
Louisville, Ky. (lower gate)	55	2	9	62.7	5-6
Dam No. 43, Evans Landing, Ind.	57	2	10	63.8	
Dam No. 44, Leavenworth, Ind.	53	1	11	63.0	
Dam No. 45, Addison, Ky.	47	2	11	54.1	
Tell City, Ind.	38	1	12	46.0	
Dam No. 46, Owensboro, Ky.	41	3	12	44.8	7-8
Dam No. 47, Newburgh, Ind.	38	Dec. 31	14	46.6	7-8
Evansville, Ind.	37	1	14	44.3	9
Dam No. 48, Henderson, Ky.	38	2	15	46.3	9
Mt. Vernon, Ind.	35	2	16	43.7	9-10
Dam No. 49, Uniontown, Ky.	37	3	16	44.6	10-11
Shawneetown, Ill.	33	1	17	44.9	11
Dam No. 50, Fords Ferry, Ky.	34	1	17	47.7	11-12
Dam No. 51, Golconda, Ill.	40	5	16	45.3	10-12
Paducah, Ky.	39	3	15	44.5	11
Dam No. 52, Brookport, Ill.	37	1	17	46.2	11
Dam No. 53, Grand Chain, Ill.	42	Dec. 31	17	50.6	11
Cairo, Ill.	40	Dec. 31	17	48.0	5-6
White Basin					
Black: Black Rock, Ark.	14	Dec. 27	14	23.6	Dec. 29
White:					
Batesville, Ark.	23	Dec. 27	2	37.6	Dec. 29
Newport, Ark.	26	Dec. 29	5	31.8	1
Georgetown, Ark.	21	Dec. 30	17	28.0	4
Des Arc, Ark.	24	2	17	31.3	7
Clarendon, Ark.	26	4	24	30.7	10
St. Charles, Ark.	25	7	28	28.6	13
Arkansas Basin					
Arkansas: Dardanelle, Ark.	22	1	1	22.0	

River and station	Flood stage	Above flood stages— dates		Crest		
		From—	To—	Stage	Date	
MISSISSIPPI SYSTEM—continued						
Red Basin						
Red: Naples, Tex.	Feet 22	Dec. 31	6	Feet 25.4	2	
Lower Mississippi Basin						
St. Francis:						
Fisk, Mo.	20	Dec. 29	2	23.0	{ Dec. 31- Jan. 1	
St. Francis, Ark.	18	3	7	19.5		
Mississippi: New Madrid, Mo.	34	2	17	38.0		
PACIFIC SLOPE DRAINAGE						
San Joaquin Basin						
Kings: Piedra, Calif.	10	{	21	22	16.2	22
Mokelumne: Bensons Ferry, Calif.	12		23	23	13.4	23
			23	26	14.4	24
Sacramento Basin						
North Fork of Yuba: Colgate, Calif.	14	21	22	17.7	21	
American: Sacramento (H St. Bridge), Calif.	39	21	22	42.5	22	
Sacramento:						
Red Bluff, Calif.	23	21	23	26.8	21	
				24.5	23	
Knights Landing, Calif.	30	23	29	31.8	25	
Sacramento, Calif.	29			28.8	22	
Eel: Fernbridge, Calif.	17.5	21	23	25.0	21-22	
Columbia Basin						
Middle Fork of Willamette: Eula, Oreg.	13	Dec. 31	1	17.0	Dec. 31	
Coast Fork of Willamette: Saginaw, Oreg.	9	Dec. 8	Dec. 8	9.5	Dec. 8	
		Dec. 30	2	11.9	Dec. 30-31	
		21	22	9.3	21-22	
McKenzie: Leaburg, Oreg.	12	Dec. 1	Dec. 2	13.4	Dec. 1	
		Dec. 27	Dec. 29	14.4	Dec. 27	
		Dec. 30	3	22.8	1	
Long Tom: Monroe, Oreg.	10	Dec. 6	(1)	17.0	1	
Calapooya: Holley, Oreg.	10.5	Dec. 30	1	12.1	Dec. 31	
Santiam: Jefferson, Oreg.	13	Nov. 29	Dec. 3	19.6	Nov. 30	
		Dec. 27	3	21.3	1	
		Nov. 24	Dec. 2	28.5	Nov. 27	
Luckiamute: Suver, Oreg.	25	Dec. 8	Dec. 10	27.3	Dec. 9	
		Dec. 28	3	28.6	1	
Yamhill:						
Whiteson, Oreg.	38	Dec. 28	2	40.9	Dec. 30	
Willamina, Oreg.	8	Dec. 29	Dec. 29	8.5	Dec. 29	
		1	1	8.1	1	
Willamette:						
Eugene, Oreg.	12	Dec. 28	Dec. 28	12.7	Dec. 28	
		Dec. 31	2	16.7	Dec. 31- Jan. 1	
Harrisburg, Oreg.	10	Nov. 27	Dec. 3	15.7	Nov. 30	
		Dec. 9	Dec. 11	13.0	Dec. 9	
		Dec. 25	5	17.1	1	
Willamette:						
Corvallis, Oreg.	24	Dec. 31	3	28.1	2	
Albany, Oreg.	20	Dec. 1	Dec. 2	22.8	Dec. 2	
		Dec. 29	4	30.6	2	
Salem, Oreg.	20	Nov. 30	Dec. 3	20.7	Dec. 2	
		Dec. 31	4	30.6	2	
Oregon City, Oreg.	12	Nov. 26	Dec. 5	13.6	Dec. 1-2	
Portland, Oreg.	18	Dec. 29	7	18.3	3	
Columbia: Vancouver, Wash.	15	2	5	20.2	3	
		3	5	16.3	4	

1 Continued into February.

2 Data furnished by Kings River Water Association.

3 Estimated.



## CLIMATOLOGICAL DATA

## CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Section	Temperature								Precipitation							
	Section average	Departure from the normal	Monthly extremes						Section average	Departure from the normal	Greatest monthly		Least monthly			
			Station	Highest	Date	Station	Lowest	Date			Station	Amount	Station	Amount		
Alabama.....	49.4	+2.9	Wetumpka.....	85	25	3 stations.....	11	20	4.07	-0.77	River Falls.....	15.60	Shottsville.....	0.61		
Arizona.....	43.6	+1.7	Ehrenberg.....	87	13	Alpine.....	-15	19	1.73	+4.3	Pinal Ranch.....	7.06	Pacimino.....	.15		
Arkansas.....	41.8	+1.6	2 stations.....	87	23	3 stations.....	-9	19	1.00	-3.31	El Dorado.....	4.36	Siloam Springs.....	.00		
California.....	45.8	+1.1	Palm Springs.....	91	14	Tamarack.....	-16	18	8.24	+3.33	Mount Wilson.....	28.61	Greenland Ranch.....	.29		
Colorado.....	26.1	+2.2	Canon City.....	80	15	Taylor Park.....	-45	19	1.04	+2.5	Wolf Creek Pass.....	12.33	Grover (near).....	.00		
Florida.....	61.0	+2.0	5 stations.....	89	17	Jasper.....	22	11	1.74	-1.02	Niceville.....	4.69	Bonita Springs.....	T		
Georgia.....	49.4	+2.4	2 stations.....	84	17	Blairsville.....	9	20	5.66	+1.41	Hawkinsville.....	14.26	La Fayette.....	2.36		
Idaho.....	22.8	-1.2	Grand View.....	64	20	Island Park Dam.....	-60	18	2.68	+5.1	Deadwood Dam.....	7.99	Grand View.....	.20		
Illinois.....	28.3	+1.6	Harrisburg.....	78	24	Freeport.....	-27	20	1.21	-1.14	Rockford.....	4.40	Chester.....	T		
Indiana.....	29.6	+1.6	Madison.....	80	24	La Porte.....	-25	20	1.17	-1.88	La Porte.....	4.82	2 stations.....	.11		
Iowa.....	16.7	-1.9	2 stations.....	54	15	Rock Rapids.....	-31	19	.79	-30	Waukon.....	2.54	Cumberland (near).....	T		
Kansas.....	30.5	+1.7	Ashland.....	83	22	Oberlin.....	-28	19	.18	-50	Hugoton.....	.77	3 stations.....	T		
Kentucky.....	37.9	+2.2	Clermont.....	82	24	2 stations.....	-1	20	1.54	-2.92	2 stations.....	3.25	Uniontown.....	.18		
Louisiana.....	51.7	+1.1	2 stations.....	87	23	do.....	8	19	3.06	-1.74	Lake Arthur (near).....	5.79	Talisheek Tower.....	1.49		
Maryland-Delaware.....	34.0	+1.8	La Plata, Md.....	79	17	Mt. Savage Summit, Md.....	-5	20	2.94	-41	Oakland, Md.....	4.37	Easton, Md.....	1.79		
Michigan.....	17.1	-3.8	South Haven.....	47	24	Mio.....	-32	7	2.00	+0.2	Painesdale.....	3.97	Manistique.....	.78		
Minnesota.....	3.1	-6.3	Canby.....	41	14	Big Falls.....	-45	19	.95	+20	Pigeon River Bridge.....	3.63	Angus.....	.20		
Mississippi.....	48.3	+1.1	3 stations.....	85	18	Hernando.....	3	19	2.09	-2.93	Port Gibson.....	3.41	Mount Pleasant.....	.45		
Missouri.....	31.1	+1.3	2 stations.....	81	24	Grant City.....	-23	19	.39	-1.97	Jefferson Barracks.....	1.41	7 stations.....	T		
Montana.....	11.1	-8.3	Columbus.....	68	13	West Yellowstone.....	-58	18	1.57	+64	West Yellowstone.....	6.09	Ennis.....	.24		
Nebraska.....	22.8	-2	Gothenburg.....	77	15	Oakdale.....	-33	19	.22	-31	Hay Springs.....	.99	2 stations.....	.00		
Nevada.....	33.2	+3.5	Desert Game Range.....	82	15	2 stations.....	-16	18	2.28	+1.07	Lewers Ranch.....	13.70	Rattlesnake.....	.07		
New England.....	18.9	-3.5	2 stations.....	52	16	Fort Kent, Maine.....	-34	22	2.47	-97	Hyannis, Mass.....	4.76	Presque Isle, Maine.....	.46		
New Jersey.....	30.3	-6	Pleasantville.....	63	16	2 stations.....	1	14	2.95	-70	Belvidere.....	4.72	Toms River.....	1.65		
New Mexico.....	35.8	+2.2	Portales Evap. Station.....	55	22	Selsor Ranch.....	-37	19	.41	-17	Chama.....	2.97	9 stations.....	.00		
New York.....	19.4	-3.6	Stafford.....	56	25	Gouverneur.....	-31	9	2.17	-73	North Lake.....	4.77	Elizabethtown.....	.58		
North Carolina.....	43.1	+1.6	2 stations.....	85	19	Mount Mitchell.....	-3	5	4.72	+97	Rock House.....	8.24	Red Springs.....	2.47		
North Dakota.....	-1.4	-7.8	6 stations.....	45	13	Hannah.....	-44	20	.73	+26	New England.....	1.85	Larimore.....	.02		
Ohio.....	29.5	+1.0	Ironton.....	78	24	Montpelier.....	-13	20	1.80	-1.22	Gallipolis (near).....	3.30	Hamilton.....	.47		
Oklahoma.....	38.6	+4	Woodward.....	89	22	Kenton.....	-22	19	.08	-1.34	Bear Mtn. Tower.....	.40	7 stations.....	.00		
Oregon.....	29.0	-2.7	Brookings.....	74	8	Meacham.....	-47	18	4.55	+74	Ilalhe.....	15.68	Umatilla.....	.68		
Pennsylvania.....	28.3	0	Greensburg.....	73	25	Coudersport.....	-12	9	2.68	-50	Laurel Hill Tunnel.....	4.85	Erie.....	.93		
South Carolina.....	47.7	+1.8	Conway.....	83	17	2 stations.....	14	5	4.94	+1.38	Anderson.....	10.00	Pinopolis.....	2.84		
South Dakota.....	9.8	-6.9	Pine Ridge.....	62	1	do.....	-41	19	.65	+11	Andover.....	1.94	Geddes.....	.07		
Tennessee.....	40.8	+1.8	Celina.....	83	23	Crossville.....	4	20	1.95	-2.82	Copperhill.....	5.49	Hohenwald.....	.42		
Texas.....	47.5	-7	2 stations.....	96	22	Dalhart.....	-17	19	1.31	-38	Matagorda.....	5.75	6 stations.....	.00		
Utah.....	28.6	+3.3	do.....	68	15	2 stations.....	-26	18	1.50	+27	Timpanogoo Summit.....	8.17	3 stations.....	.00		
Virginia.....	38.6	+2.2	Warsaw.....	82	17	do.....	0	20	2.76	-59	Lynchburg.....	4.18	Saluda.....	1.40		
Washington.....	25.1	-5.6	2 stations.....	61	14	Stockdill Ranch.....	-33	22	2.81	-2.16	Tatoosh Island.....	11.83	Quincy (near).....	.18		
West Virginia.....	35.6	+3.0	Huntington.....	80	24	Pickens.....	-9	20	3.43	-17	Pickens.....	5.87	Kermit.....	1.71		
Wisconsin.....	12.0	-3.1	2 stations.....	44	22	4 stations.....	-35	19	1.62	+38	West Bend.....	2.91	P. K. Reservoir.....	.76		
Wyoming.....	20.2	+3	Yoder.....	70	1	Lamar Ranger Station.....	-58	18	1.09	+30	Grassy Lake Dam.....	8.87	Carpenter.....	T		
Alaska (December).....	-4.5	-9.5	Ketchikan.....	52	11	Northway.....	-62	19	1.61	-83	Baranof.....	18.61	Hughes.....	T		
Hawaii.....	70.7	+1.7	4 stations.....	87	9	Volcano Observatory.....	42	21	10.43	+2.25	Intake.....	24.25	Puu Mail.....	.44		
Puerto Rico.....	73.7	+6	Ponce.....	95	13	2 stations.....	51	10	4.84	+79	La Mina (El Yunque).....	21.04	Santa Isabel.....	.00		

<sup>1</sup> Other dates also.

## CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS

District and station	Elevation of instruments				Temperature of the air											Precipitation		Wind				Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms			
	Barometer above sea level	Thermometer above ground	Anemometer above ground	Pressure—Station, reduced to mean of 24 hours	Mean max. + mean min. + 2	Departure from normal	Maximum	Date	Mean maximum	Minimum	Date	Mean minimum	Greatest daily range	Mean temperature of the dew-point	Mean relative humidity	Total	Departure from normal	Days with 0.01 inch or more	Average hourly velocity	Prevailing direction	Maximum velocity										
																					Miles per hour								Direction	Date	
New England	ft.	ft.	ft.	in.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	%	In.	In.	Miles													
					20.2	-2.7									73	2.63	-0.8														
Eastport	75	67	85	29.86	17.0	-2.8	37	25	24	-8	21	12	24	9	70	1.54	-2.4	9	12.6	nw.	41	nw.	20	14	4	13	5.2	7.3	4.4	0	0
Greenville, Maine	1,070	6	41	28.77	8.4	-3.8	38	25	18	-18	21	-2	37	5	67	1.19	-1.7	11	nw.	nw.	nw.	20	16	4	11	4.8	17.7	23.5	0	0	
Portland, Maine	103	5	36	29.90	17.6	-4.6	42	15	27	-10	22	8	38	6	71	2.12	-9.3	10	8.9	n.	41	w.	20	16	4	11	4.8	17.7	23.5	0	0
Concord	289	4	45	29.72	17.0	-4.6	43	15	26	-14	9	8	41	9	71	2.12	-9.3	10	8.9	n.	34	nw.	19	10	7	14	5.9	22.4	16.0	0	0
Burlington	403	11	48	29.61	13.2	-5.6	42	25	21	-14	22	5	31	7	81	.92	-1.8	12	9.3	n.	34	se.	25	6	7	18	7.1	10.7	3.3	0	0
Northfield	876	12	60	29.08	12.3	-2.9	49	25	23	-22	9	2	37	1	70	1.18	-1.2	13	7.3	n.	25	sw.	19	8	8	15	6.3	14.0	16.8	0	0
Boston	124	33	62	29.60	25.5	-1.9	47	25	32	3	22	19	21	16	70	3.71	+1.1	13	13.0	w.	40	ne.	28	9	6	16	6.5	26.4	17.5	0	0
Nantucket	12	10	63	30.00	29.4	-1.9	47	19	34	10	22	24	23	22	78	4.48	+7.14	14	13.0	nw.	33	nw.	19	10	5	16	6.3	9.4	4.5	0	0
Block Island	26	11	46	30.01	29.4	-1.6	47	25	35	8	22	24	23	22	73	2.90	+9.14	14	20.2	nw.	59	nw.	19	12	8	11	5.2	5.8	5.0	1	0
Providence	159	46	60	29.88	26.9	-1.3	54	25	34	4	22	20	22	17	71	4.07	+4.15	10	10.0	n.	35	nw.	19	8	8	15	6.2	24.5	13.0	0	0
Hartford	159	5	44	29.89	24.5	-1.6	46	25	32	4	22	18	28	17	77	3.75	-2.16	15	9.2	n.	34	nw.	19	7	9	15	6.7	19.6	13.4	0	0
New Haven	107	74	153	29.65	27.4	-1.8	48	16	34	6	22	21	21	19	75	3.57	-4.15	15	9.7	n.	30	n.	28	6	10	15	6.3	12.4	8.6	1	0
Middle Atlantic States					33.0	+0.9									74	2.87	-0.3														
Albany	97	26	40	29.98	17.8	-2.3	42	25	26	-11	9	10	35	11	77	2.45	-0.1	13	9.5	n.	28	s.	14	5	6	20	7.3	18.4	12.0	0	0
Binghamton	871	57	79	29.10	22.8	-1.3	49	16	31	-6	9	15	31	17	83	2.39	-0.1	14	6.5	w.	30	w.	19	5	14	12	6.6	14.4	4.8	1	0
New York	314	415	454	29.72	30.8	-1.1	55	16	38	10	22	24	22	19	62	3.22	-4.14	13	15.5	n.	64	nw.	19	6	12	13	6.5	4.4	6.0	1	0
Harrisburg	374	30	49	29.72	30.8	+1.8	55	25	37	13	14	25	23	75	2.35	-8.14	14	7.7	nw.	38	nw.	19	4	6	21	17.8	9.8	1	0	0	
Philadelphia	114	174	367	29.97	31.8	-1.8	56	16	38	15	20	26	25	23	72	3.25	-0.12	12	9.8	ne.	37	nw.	19	3	11	17	7.4	2.3	2.2	0	0
Reading	323	47	306	29.72	31.4	+2.5	57	16	38	12	20	25	25	23	72	2.46	-0.12	12	11.4	n.	50	nw.	19	5	9	17	7.0	12.5	6.8	1	0
Scranton	805	72	104	29.17	25.9	-1.7	48	25	32	4	22	20	27	25	71	2.11	-9.12	12	6.9	n.	32	nw.	19	3	8	14	7.4	13.3	6.5	0	0
Atlantic City	52	37	172	30.02	34.4	+1.9	53	17	40	16	20	29	25	25	71	3.55	+1.11	11	16.5	n.	47	ne.	28	8	7	16	6.7	2.2	0	0	0
Trenton	190	89	107	29.88	31.0	+1.5	57	16	37	14	20	25	22	21	67	2.56	-8.13	13	9.7	n.	32	nw.	19	4	5	13	13.6	6.2	2.5	0	0
Baltimore	123	100	215	29.96	35.0	+1.2	66	16	41	16	20	29	26	26	75	3.53	-0.15	15	9.8	sw.	42	sw.	19	7	11	17	6.7	2.3	4.0	0	0
Washington	112	56	100	29.97	36.2	+2.8	74	17	43	15	20	29	32	26	72	2.87	-1.7	11	7.7	ne.	43	nw.	19	7	11	13	6.6	6.2	2.7	0	0
Cape Henry	18	8	54	30.06	42.4	+2.2	77	17	50	22	20	35	43	35	79	2.14	-1.0	10	13.5	sw.	42	n.	19	12	5	14	5.7	1.8	0	0	0
Lynchburg	686	144	184	29.34	41.1	+3.6	78	17	51	15	20	31	46	30	72	4.18	+8.10	10	7.6	sw.	36	nw.	19	12	5	12	5.3	1.3	1.3	0	0
Norfolk	91	80	125	29.99	43.3	+2.7	77	17	51	21	20	36	41	34	81	2.80	-3.11	10	10.2	sw.	33	nw.	19	10	7	14	5.6	2.0	0	0	0
Richmond	144	11	52	29.92	40.4	+2.5	80	17	50	17	20	31	45	31	77	3.19	-0.9	9	8.6	sw.	30	w.	4	14	6	11	5.4	1.1	0	0	0
South Atlantic States					58.0	+2.6									81	4.25	+0.7														
Asheville	2,253	89	104	27.70	41.4	+6.0	74	25	52	12	20	30	45	32	78	3.43	+3.10	8.2	nw.	42	nw.	19	6	11	14	6.0	4	0	0	2	
Charlotte	779	63	86	29.26	44.1	+2.9	75	17	53	19	20	36	38	32	80	6.15	+2.2	12	8.2	sw.	24	nw.	19	7	14	14	5.8	0	0	0	2
Greensboro	886	6	56	29.14	41.2	-1.1	76	17	51	14	6	31	44	32	78	4.58	-0.11	13	9.0	sw.	39	nw.	19	8	10	13	5.9	0	0	0	2
Hatteras	11	5	50	30.08	47.0	-1.6	67	25	53	31	20	41	24	42	86	5.07	+6.11	13.7	n.	40	nw.	4	12	5	14	5.7	0	0	0	4	
Raleigh	376	27	69	29.70	43.4	+3.6	77	17	53	10	21	34	43	35	80	4.40	+7.8	10.1	sw.	39	nw.	4	11	5	15	5.7	0	0	0	2	
Wilmington	72	73	107	30.04	48.1	+1.6	78	26	57	27	20	40	35	40	83	4.70	+1.4	9	10.1	sw.	32	nw.	19	12	9	10	5.0	0	0	0	2
Charleston	48	11	92	30.07	50.4	+5.4	74	25	58	29	5	43	29	42	83	3.49	+4.9	10.2	n.	26	nw.	19	12	10	9	5.2	0	0	0	2	
Columbia, S. C.	347	70	91	29.73	48.4	+2.4	78	25	58	25	20	39	32	40	84	3.01	+4.9	10.2	n.	28	sw.	17	10	7	14	5.7	0	0	0	2	
Greenville, S. C.	1,040	70	78	28.96	45.0	+4.7	77	17	54	22	20	36	36	35	77	4.08	+3.7	10	9.8	sw.	38	w.	26	12	5	14	5.6	0	0	0	4
Augusta	182	62	77	29.92	49.6	+2.6	80	17	59	25	6	40	33	40	75	4.08	+2.2	8	6.0	s.	21	w.	17	11	7	13	5.7	0	0	0	3
Savannah	65	73	152	30.06	53.6	+2.2	81	17	63	30	5	44	28	43	80	2.63	-1.2	8	10.6	sw.	33	w.	10	13	11	7	4.8	0	0	0	3
Jacksonville	43	86	110	30.09	57.4	+2.0	84	17	67	32	5	48	32	47	81	1.32	-1.6	6	7.4	s.	25	w.	10	14	7	10	5.1	0	0	0	2
Florida Peninsula					68.5	+3.0									84	1.70	-0.7														
Key West	21	10	64	30.07	72.6	+3.1	84	19	78	60	11	68	15	63	80	1.71	-1.2	5	9.0	ne.	29	w.	28	17	11	3	3.2	0	0	0	0
Miami	25	124	168	30.08	70.0	+3.5	80	17	76	46	11	64	21	61	87	4.04	+1.5	7	10.3	se.	26	se.	17	14	11	6	4.1	0	0	0	2
Tampa	35	5	61	30.09	62.8	+2.4	82	17	72	40	5	53	28	54	84	3.5	-2.3	5	8.8	ne.	27	sw.	27	12	9	10	4.9	0	0	0	1
East Gulf States					50.9	+2.4									80	4.04	-0.7														
Atlanta	1,173	5	72	28.86	46.3	+3.8	76	25	55	17	20	37	43	38	78	6.09	+1.1	7	10.4	sw.	50	nw.	19	8	8	15	6.6	0	0	0	3
Macon	370	79	87	29.72	49.6	+2.8	77	25																							



## CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments			Pressure—Station, reduced to mean of 24 hours	Temperature of the air										Precipitation		Wind				Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms			
	Barometer above sea level	Thermometer above ground	Anemometer above ground		Mean max. + min. + 2	Departure from normal	Maximum	Date	Mean maximum	Minimum	Date	Mean minimum	Greatest daily range	Mean temperature of the dew-point	Mean relative humidity	Total	Departure from normal	Days with 0.01 inch or more	Average hourly velocity	Prevailing direction								Maximum velocity		
																												Miles per hour	Direction	Date
Ohio Valley and Tennessee—Continued																														
Columbus <sup>1</sup>	822	90	110	29.17	32.0	+3.4	61	24	39	3	20	25	34	26	86	2.03	-1.0	14	10.8	s.	36	3	5	23	8.1	5.5	0	1		
Dayton <sup>1</sup>	900	186	213	29.08	31.8	+2.3	71	24	40	1	20	24	38	25	88	1.37	-1.9	13	11.1	sw.	36	4	3	22	7.8	4.3	0	0		
Elkins <sup>1</sup>	1,947	61	78	27.97	35.2	+4.8	70	25	45	3	20	26	52	27	81	4.12	+3.7	17	7.3	w.	33	4	4	23	7.9	12.8	0	0		
Parkersburg	637	77	84	29.38	35.6	+3.1	74	24	44	6	20	27	40	28	79	2.41	-1.2	17	6.8	se.	33	4	5	20	7.5	11.2	0	1		
Pittsburgh <sup>1</sup>	842	39	54	29.14	30.6	+2.3	65	24	38	4	20	23	38	25	82	2.93	-1.1	21	11.4	s.	45	4	1	29	9.0	14.3	T	2		
Lower Lake Region																														
Buffalo <sup>1</sup>	768	243	280	29.20	21.2	-3.4	52	24	28	-2	21	15	30	17	83	1.99	-1.3	18	16.8	w.	50	19	0	7	24	8.6	16.9	2.0	1	
Canton	448	10	61	29.57	9.0	-7.3	44	25	18	-24	22	0	38	7	90	1.58	-9.9	13	8.1	w.	40	19	5	6	20	7.6	18.0	16.2	0	
Ithaca	836	77	100	29.22	22.3	-2.0	50	16	30	-8	9	15	35	13	86	1.35	-8.8	17	9.4	nw.	32	19	2	8	26	8.8	15.2	2.8	0	
Oswego	335	71	85	29.69	20.4	-3.5	44	25	27	-7	9	14	25	13	74	1.95	-1.0	21	10.7	se.	35	19	2	8	21	8.3	26.8	7.2	0	
Rochester <sup>1</sup>	523	5	69	29.48	20.4	-2.8	46	25	28	-6	9	13	30	17	86	2.06	-8.8	17	11.1	w.	45	19	1	4	26	8.6	17.2	5.0	0	
Syracuse <sup>1</sup>	596	5	51	29.40	19.2	-3.6	46	25	29	-15	9	17	34	16	88	2.09	-6.6	21	9.4	sw.	45	19	1	6	24	8.5	18.4	2.0	0	
Erie <sup>1</sup>	714	57	81	29.27	25.8	-1.0	55	25	32	6	20	20	33	21	86	1.93	-1.8	7	9.8	de.	30	19	2	7	22	8.4	7.5	0	0	
Cleveland <sup>1</sup>	762	27	54	29.22	26.8	+2.1	57	24	34	-2	20	20	34	22	86	1.88	-6.6	16	11.9	sw.	43	19	2	3	26	8.8	11.8	0	0	
Sandusky	629	5	67	29.27	26.5	+2.5	55	24	33	-3	20	20	32	20	87	1.64	-6.6	17	10.2	sw.	30	19	2	7	22	8.4	12.1	0	0	
Toledo <sup>1</sup>	628	79	87	29.37	23.4	-2.4	48	24	30	-8	20	17	30	20	87	1.90	-3.3	17	10.6	w.	31	19	3	1	24	7.8	13.2	T	0	
Fort Wayne <sup>1</sup>	857	69	84	29.12	23.3	-2.1	53	24	32	-13	20	15	35	20	90	1.37	-1.0	13	9.2	w.	34	14	4	5	22	7.5	11.7	2	0	
Detroit <sup>1</sup>	730	5	78	29.26	21.6	-2.5	45	24	28	-6	20	15	25	18	84	2.25	+2.2	17	10.3	sw.	40	31	4	4	23	7.9	18.4	2.0	0	
Upper Lake Region																														
Alpena	609	5	89	29.37	17.7	-1.4	36	31	24	-8	27	11	32	14	90	2.66	+3.8	22	11.1	nw.	32	19	4	7	20	7.5	41.8	12.5	0	
Escanaba	612	51	72	29.38	14.9	-5.3	33	30	22	-13	26	7	33	11	84	1.82	-4.4	18	10.3	nw.	30	19	4	9	18	7.3	18.2	21.7	0	
Grand Rapids <sup>1</sup>	707	70	244	29.27	21.5	-3.0	41	24	27	-2	20	16	25	16	84	1.92	-4.4	17	11.6	de.	34	19	3	6	22	8.1	29.9	9.0	0	
Lansing <sup>1</sup>	878	5	90	29.08	19.2	-3.2	40	24	26	-10	20	12	31	15	87	2.99	+1.2	18	8.8	de.	27	19	3	1	20	7.6	33.6	8.4	0	
Marquette	734	44	73	29.23	15.0	-1.3	35	28	21	-13	20	9	28	9	74	1.58	-8.8	22	8.6	w.	27	13	1	6	24	8.5	16.9	24.0	0	
Sault Sainte Marie <sup>1</sup>	614	11	43	29.36	11.3	-8.3	30	29	18	-13	21	4	26	7	84	1.35	-7.7	20	11.2	e.	42	19	3	9	19	7.6	17.5	19.1	0	
Chicago <sup>1</sup>	673	19	38	29.31	22.6	+3.4	44	22	30	-13	20	15	35	19	87	2.12	+2.2	11	10.3	nw.	34	19	9	6	16	6.2	20.8	6	0	
Green Bay	617	109	141	29.39	13.7	-2.0	36	22	22	-16	20	5	31	12	87	1.86	+3.3	14	11.1	n.	28	24	7	4	20	7.1	24.4	19.9	0	
Milwaukee <sup>1</sup>	681	33	66	29.31	18.6	-8.3	38	30	27	-18	20	11	33	14	78	2.15	+4.4	16	13.6	nw.	35	14	7	5	19	6.8	28.4	12.6	0	
Duluth	1,133	5	47	28.81	5.6	-2.3	30	14	14	-28	20	-3	30	0	86	1.81	-2.2	11	13.2	nw.	43	14	7	6	18	6.8	9.3	11.0	0	
North Dakota																														
Fargo <sup>1</sup>	940	5	43	29.10	-1.3	-5.1	37	13	8	-30	17	-11	50	-5	83	3.33	-3.3	11	11.9	n.	35	24	7	7	17	6.8	3.3	5.8	0	
Bismarck <sup>1</sup>	1,677	4	41	28.30	-2.0	-8.3	42	13	8	-38	18	-12	53	-5	85	2.75	+3.3	13	9.5	nw.	36	11	6	10	15	6.6	9.6	8.4	0	
Devils Lake	1,478	11	44	28.50	-4.8	-6.6	37	13	4	-34	17	-14	42	-6	90	3.39	-1.0	10	9.0	nw.	26	9	6	7	18	7.1	4.4	7.1	0	
Lemmon, S. Dak.	2,602	4	38	27.33	1.6	-4.3	43	13	12	-42	17	-9	39	0	91	1.04	-5.8	10	8.0	nw.	20	10	3	18	7.1	15.8	5.3	0		
Grand Forks	832	11	71	29.24	-4.6	-7.7	37	13	5	-32	17	-14	51	-7	81	1.51	+1.0	13	6.9	n.	25	9	7	10	14	6.6	15.0	10.8	0	
Williston	1,878	42	50	28.10	-1.3	-7.7	42	13	7	-35	17	-10	38	-4	81	1.51	+1.0	13	6.9	n.	25	9	7	10	14	6.6	15.0	10.8	0	
Upper Mississippi Valley																														
Minneapolis-St. Paul, Minn. <sup>1</sup>	919	32	61	29.08	7.8	-4.9	37	14	17	-31	19	-1	43	1	74	1.92	0.0	13	10.4	nw.	37	14	9	2	20	6.7	10.1	14.2	0	
Springfield, Minn.	1,025	4	42	28.98	6.4	-6.2	39	14	15	-24	19	-2	48	0	73	1.82	-10.0	10	10.4	nw.	37	14	6	10	15	6.7	11.4	3.0	0	
La Crosse <sup>1</sup>	714	11	48	29.30	9.9	-6.2	39	22	20	-28	19	0	41	5	83	1.66	+6.2	12	8.9	s.	25	14	7	7	17	6.4	20.3	20.4	0	
Madison <sup>1</sup>	974	70	78	29.60	15.0	-1.7	40	22	23	-16	20	7	29	11	88	2.10	+7.7	15	9.1	nw.	25	14	7	11	13	6.0	25.8	16.1	0	
Charles City	1,015	10	51	28.98	11.8	-1.9	40	22	21	-24	19	3	39	6	79	1.14	+1.9	9	7.2	nw.	22	14	8	6	17	6.4	18.6	12.8	0	
Davenport <sup>1</sup>	606	66	161	29.42	20.4	-1.4	47	22	28	-15	19	12	36	16	88	1.62	+2.2	13	10.3	de.	28	19	9	6	16	6.3	16.3	2.4	0	
Des Moines <sup>1</sup>	860	5	99	29.15	19.0	-1.1	49	22	27	-14	19	11	30	12	77	1.63	-4.4	10	10.9	nw.	26	14	3	9	6	16.0	8.6	4.0	0	
Dubuque	699	69	79	29.34	16.8	-2.3	45	22	26	-16	20	8	34	11	77	1.67	+4.4	13	7.0	nw.	27	14	7	12	12	6.0	25.7	10.8	0	
Burlington, Iowa <sup>1</sup>	702	6	35	29.31	22.0	-1.9	48	22	30	-15	19	14	37	16	77	1.25	-5.5	11	9.9	nw.	28	19	10	8	13	5.9	13.5	1.4	0	
Cairo	357	5	99	29.72	37.2	+2.3	74	24	46	5	19	28	39	12	83	3.34	-4.4	4	10.3	sw.	29	19	10	6	16	6.2	1.9	0	0	
Peoria <sup>1</sup>	609	11	45	29.43	24.3	+1.2	48	30	32	-12	19	17	39	20	87	1.84	+1.1	12	6.9	w.	24	15	9	4	18	6.5	14.3	3.0	0	
Springfield, Ill. <sup>1</sup>	636	5	191	29.39	27.7	+1.1	52	24	35	-7	19	20	44	22	86	1.01	-1.1	11	11.7	nw.	34	19	3	9	5	17	6.4	3.1	T	0
St. Louis <sup>1</sup>	568	179	303	29.48	32.1	+1.0	73	24	41	-5	19	24	61	23	76	1.74	-1.6	10	13.0	nw.	35	19	11	7	13	8.5	2.0	0	1	
Missouri Valley																														
Columbia, Mo. <sup>1</sup>	784	6	66	29.24	29.3	+1.1	65	22	39	-12	19	20	48	19	72	1.88	-1.0	7	8.2	nw.	24	15	10	9	12	5.6	3.9	0	1	
Kansas City, Mo.	963	38	76	29.05	28.3	-0.7	63	15	37	-13	19	20	40	21	75	1.51	-1.1	9	11.4	nw.	37	15	9	7	15	5.6	3.4	0	0	
St. Joseph <sup>1</sup>	967	11	49	29.06	28.3	-0.7	60	15	3																					

## CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments			Pressure—Station, reduced to mean of 24 hours	Temperature of the air								Mean temperature of the dew-point	Mean relative humidity	Precipitation			Wind			Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths		Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunder-storms				
	Barometer above sea level	Thermometer above ground	Anemometer above ground		Mean	max.	min.	+ 2	Departure from normal	Maximum	Date	Mean			Minimum	Date	Mean	Greatest daily range	Total	Departure from normal				Days with 0.01 inch or more	Average hourly velocity				Prevailing direction	Maximum velocity		
																														Miles per hour	Direction	Date
<i>Ft.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>In.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>%</i>	<i>In.</i>	<i>In.</i>		<i>Miles</i>						<i>0-10</i>	<i>In.</i>	<i>In.</i>					
<b>Southern Slope</b>					<b>44.1</b>	<b>+1.4</b>										<b>57</b>	<b>0.25</b>	<b>-0.4</b>								<b>5.2</b>						
Abilene <sup>2</sup>	1,738	10	56	28.27	45.1	+1.9	89	23	58	5	19	32	43	27	59	2.9	-1.7	2	9.9	s.	26	21	10	9	12	5.5	1.2	0				
Amarillo <sup>3</sup>	3,676	10	49	26.27	37.4	+2.1	75	22	51	-7	19	23	45	21	60	0.8	-1.4	1	15.8	sw.	50	22	13	5	13	4.9	0	0				
Del Rio	960	63	71	29.08	51.8	-1.5	89	24	64	20	19	39	46	34	57	5.8	-0.5	3	7.3	e.	25	18	13	9	9	4.9	0	0				
Roswell	3,596	75	85	26.41	42.2	+3.0	78	15	58	7	19	27	48	22	53	0.5	-1.5	2	7.4	s.	36	18	12	6	13	5.3	0	0				
<b>Southern Plateau</b>					<b>47.4</b>	<b>+3.1</b>									<b>51</b>	<b>0.94</b>	<b>+0.3</b>								<b>4.7</b>							
El Paso <sup>1</sup>	3,778	82	101	26.23	44.4	+1.8	72	22	56	18	20	33	41	27	53	2.5	1.2	2	10.0	sw.	45	18	12	10	9	5.3	1.5	0				
Albuquerque <sup>1</sup>	5,314	5	45	24.75	38.6	+4.5	63	16	50	4	19	27	32	23	54	2.5	1.2	1	8.4	n.	36	24	11	8	12	5.4	1.0	0				
Flagstaff	6,907	10	59																													
Phoenix <sup>2</sup>	1,107	39	87	28.87	53.5	+2.3	73	16	66	30	19	41	34	35	58	7.3	-1	4	5.1	e.	25	7	10	9	12	5.5	0	0				
Tucson <sup>1</sup>	2,555	5	23	27.39	52.8	-1.7	76	1	66	30	19	40	39	30	48	4.4	-1.5	3		se.			9	8	14	5.8	0	0				
Yuma	142	9	54	29.88	57.8	+3.4	81	15	70	35	20	45	36	33	44	3.3	-1	2	6.8	n.	26	7	19	8	4	3.1	0	0				
Independence	3,957	5	26	26.01	42.8	+4.6	73	14	55	11	19	30	36	23	50	3.63	+2.7	8		nw.		21	5	5		3.3	0	0				
<b>Middle Plateau</b>					<b>31.9</b>	<b>+3.8</b>									<b>67</b>	<b>1.43</b>	<b>+0.5</b>								<b>4.5</b>							
Reno <sup>2</sup>	4,527	61	76	25.49	34.4	+2.8	68	15	48	0	18	20	50	23	68	4.05	+2.5	8	6.9	nw.	49	21	16	2	13	4.5	3.0	0				
Tonopah	6,090	9	20	24.03	32.2	+1.6	54	14	41	2	18	24	24	23	69	6.2	+1.1	5		sw.		18	8	5		1.4	0	0				
Winnemucca	4,339	5	56	25.66	32.0	+3.4	56	15	43	-4	18	21	34	24	74	1.87	+1.8	12	8.5	sw.	40	20	11	7	13	5.7	6.6	0				
Modena	5,473	10	46		29.7	+3.0	62	15	41	-6	19	18	47			9.2	+1	7	9.3	w.	36	17	13	9	9	4.7	6.1	0				
Salt Lake City <sup>1</sup>	4,227	86	47	25.66	31.0	+3.5	58	1	38	1	18	24	26	23	70	9.5	0	8	10.0	se.	45	21	5	5	21	7.5	6.7	1.0				
Grand Junction	4,602	60	68	25.42	32.2	+8.2	56	16	44	3	19	21	38	16	52	1.5	-1.4	4	5.6	se.	27	24	13	6	12	4.6	8	0				
<b>Northern Plateau</b>					<b>23.8</b>	<b>-3.1</b>									<b>79</b>	<b>1.15</b>	<b>-0.5</b>								<b>8.1</b>							
Baker <sup>1</sup>	3,471	36	54	26.48	21.6	-3.3	48	15	30	-17	18	13	28	18	88	1.59	+2	14	5.5	s.	28	21	4	5	22	7.8	25.6	7.1				
Boise <sup>1</sup>	2,739	5	49	27.25	28.2		53	21	36	-10	18	21	22	24	81	1.27	-1.5	13	9.8	se.	34	15	3	5	23	8.1	7.3	1.0				
Pocatello <sup>1</sup>	4,478	5	31	25.49	26.8	+4.5	50	21	34	-5	18	20	31	20	74	8.9	-4	10	12.1	sw.	56	21	2	10	19	7.5	2.3	0				
Spokane <sup>1</sup>	1,929	27	42	28.06	21.8	-5.7	44	14	29	-6	25	15	28	18	80	1.25	-9	11	5.7	sw.	31	14	3	4	24	8.6	17.7	6.8				
Walla Walla	991	57	65	29.10	26.6	-6.1	58	14	33	0	18	20	32		90	-1.1	10	5.4	s.	29	14	3	2	26	8.6	8.1	2.0					
Yakima	1,076	58	67	29.00	22.4	-5.0	59	14	30	-5	24	15	36	16	73	9.9	-3	5	4.5	nw.	29	14	3	6	22	8.0	10.4	8.1				
<b>North Pacific Coast Region</b>					<b>36.8</b>	<b>-3.4</b>									<b>82</b>	<b>5.03</b>	<b>-1.5</b>								<b>7.6</b>							
North Head	211	5	56	29.83	39.2	-2.9	60	8	44	18	18	34	21	33	77	5.01	-3.8	19	13.2	e.	58	19	7	7	17	6.6	3.5	0				
Seattle <sup>2</sup>	125	90	321	29.96	36.4	-4.4	54	14	41	13	18	32	17	30	81	3.15	-1.8	12	8.9	se.	43	14	4	8	19	7.4	18.4	0				
Tacoma	194	172	201	29.91	35.1	-3.7	57	14	40	10	18	30	16	29	79	2.16	-4.0	12	8.0	n.	40	15	4	5	22	7.6	8.0	0				
Tatoosh Island	86	9	61	29.96	37.8	-3.4	50	8	41	16	21	34	14	32	77	5.16	-6.7	19	20.7	e.	58	4	5	6	20	7.4	9.9	0				
Medford <sup>1</sup>	1,329	29	58	28.69	35.3	-2.6	58	4	41	13	18	30	24	32	87	6.44	+1.1	11		n.		22	4	25	8.6	3.5	0	0				
Portland, Oreg. <sup>2</sup>	154	68	106	29.95	35.0	-4.4	54	14	40	11	18	30	16	29	83	6.30	-3	14	6.0	e.	23	19	7	6	18	6.8	17.3	1.0				
Roseburg	510	45	76	29.57	38.8	-2.4	56	25	45	15	18	33	24	34	84	7.01	+1.7	16	3.9	e.	25	4	0	6	25	8.7	3.0	0				
<b>Middle Pacific Coast Region</b>					<b>48.3</b>	<b>+1.3</b>									<b>73</b>	<b>7.47</b>	<b>+1.9</b>								<b>5.6</b>							
Eureka	40	72	88	30.02	47.0	+1.1	75	8	54	26	18	40	33	41	79	5.23	-1.9	13	8.1	se.	40	21	10	5	16	6.1	0	0				
Redding <sup>1</sup>	722	20	34	29.30	47.5	+2.2	76	13	56	27	18	39	31	32	60	11.46	+4.6	13	8.3	nw.	34	21	12	3	16	5.9	20.0	0				
Sacramento <sup>1</sup>	66	92	115	30.01	46.7	+1.9	65	7	55	29	9	38	32	40	78	7.04	+3.3	10	8.0	se.	31	21	10	9	12	5.6	0	0				
San Francisco	155	112	132	29.90	51.9	+2.0	65	6	58	39	18	46	19	42	75	6.15	+1.6	11	7.0	n.	35	21	15	5	11	4.7	0	0				
<b>South Pacific Coast Region</b>					<b>53.4</b>	<b>+2.0</b>									<b>66</b>	<b>5.24</b>	<b>+3.0</b>								<b>5.3</b>							
Fresno <sup>1</sup>	327	5	35	29.71	45.6	+1.1	61	14	56	23	18	36	32	40	79	1.48	-2	8	4.6	se.	19	22	7	10	14	6.5	0	0				
Los Angeles	338	223	250	29.69	57.6	+3.0	77	3	66	39	19	49	26	37	55	7.98	+4.9	9	7.9	se.	43	22	17	4	10	4.3	0	0				
San Diego <sup>1</sup>	87	20	55	29.96	57.0	+3.0	83	3	66	40	20	48	38	43	65	6.26	+4.2	10	6.7	n.	44	23	15	3	13	5.0	0	0				
<b>West Indies</b>																																
San Juan, P. R.	82	10	54	29.94	75.2	+2	82	15	80	67	22	71	13	69	82	8.07	+3.9	24	12.3	e.	33	18	4	23	4	5.5	0	0				
<b>Panama Canal</b>																																
Balboa Heights	118	6	92	29.77	80.3	-4	90	8	88	68	22	72	20		1.20	+2	10	6.0	nw.	24	29	3	27	1	5.2	0	0					
Cristobal	27	47	97	29.85	81.0	-5	88	27	85	72	25	77	15	75	72	2.18	-1.2	18	2.0	n.	26	6	6	21	4	5.4	0	0				
<b>Alaska</b>																																

## LATE REPORTS FOR DECEMBER, 1942



## SEVERE LOCAL STORMS, JANUARY 1943

[Compiled by Mary O. Souder]

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Cheyenne, Kimball, Banner, and Scottsbluff Counties, Nebr.	15	5 a.m.-6 p.m.	160		\$5,000	High wind and dust	Scattered damage to farm buildings and windmills; some injury to winter wheat and to soil by erosion and drifting.
Broadus, Mont., vicinity of Camp Carson, Colo.	19 20-21	7 p.m.			1,000,000	Blizzard. Straight-line wind	Loss of 1,000 sheep. Fire started by wind caused considerable damage to buildings and wires; 10 persons seriously injured.
Arvada, Wheatridge, and Broomfield, Colo.	20-21				5,000	do.	Property damaged; loss in 2,500 acres of winter wheat; 1 person injured.
Loveland, Colo.	20-21				10,000	do.	Loss to crops, \$1,500; damage to fences, buildings, and trees, \$500.
Morrison, Colo.	20-21				2,500	do.	Roof of a schoolhouse blown off and landed on a nearby house. Damage to other property said to be high, but not estimated.
Colorado Springs, Colo.	20-22				81,100	do.	Damage principally to property; 11 persons injured.
California, southern portion.	20-31					Rain and flood	Heaviest rain fell from the 20th to 23d. Hundreds of acres of farm land inundated and approximately 110 families were evacuated because of the flood waters. Heavy rains in the mountains and foothill districts of the eastern tributaries of the San Joaquin River caused flooding of river bottoms and some loss of livestock.
Boulder, Colo.	21	A.m.			2,000	do.	Damage to trees and property.
California, entire State.	21-22				250,000	High winds	Damage most severe along the southern coast where fruit was scarred or blown from trees, orchard and shade trees uprooted, roofs damaged, windows broken, electrical service disrupted, and small craft driven ashore. In San Diego Valley damage was estimated at \$250,000. Orchard and shade trees were also uprooted in Sacramento Valley.
Virginia, entire State except extreme southeastern counties.	27-28	1 a.m. of 27th to midnight of 28th.			1,000,000	Glaze and sleet	The heaviest ice appeared to be in the area around Richmond where it reached a thickness of 1 inch. There was \$500,000 damage to telephone, telegraph, and electric lines with damage to shade trees and timber estimated to be not less than \$500,000. In the fruit-growing districts there was more sleet and less glaze and comparatively small damage. During the same period 9 to 12 inches of snow fell in extreme northwestern counties.
Washington, D. C.	27-28			3	40,000	Ice and sleet	The heavy fall of sleet was quite unusual in this vicinity. The cover included a small amount of snowfall on a thin ground layer of ice that formed on the 27th. Under the impact of heavy motor traffic the sleet became almost as dense as ice. Ruts were gouged in the ice and motor traffic was greatly hindered. Numerous accidents reported; at least 7 persons were injured, \$40,000 estimate only of clearing streets.
Lynchburg, Va., and vicinity.	27-30				20,000	Glaze	In the early morning of the 27th rain changed to a drizzle and began freezing as it struck. Sleet began falling in the afternoon and the drizzle ended, but ice had accumulated on trees, wires, grass, and other objects to a thickness of three-fourths of an inch. This ice remained until the daylight hours of the 30th when rising temperatures caused the ice to melt. The sleet storm continued from shortly after noon of the 27th to near noon of the 28th and the accumulated depth of sleet on the ground at the end was 3.0 inches. Damage from this storm was comparatively light and spread over many forms of activity; wire communication and travel were the most affected. Temperature did not go below 28° during the period the ice was at its worst and this prevented serious damage from freezing as well as kept the streets and highways in condition for removal of the accumulated ice.

<sup>1</sup> Miles instead of yards.

## LATE REPORTS DECEMBER 1942

[The table herewith contains such data as has been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Airport, Greenville, S. C.	1	4:37 p. m.			\$70,000	Thunderstorm	10 planes, staked to the ground damaged to the extent of \$65,000; property damage, \$5,000.
Calhoun Falls to Abbeville, S. C., vicinity of.	1	6:30 p. m.	200		30,000	do.	20 buildings damaged; livestock killed; trees, poles, and wires down.
Nowberry, S. C., 1 mile north.	1	7:06 p. m.	250	0	25,000	Tornado	Buildings, poles, and wires wrecked; power line towers badly twisted; path 880 yards long.
Hartsville to Darlington, S. C.	1	8 p. m.	100		75,000	Thunderstorm	Many buildings and roofs damaged; trees blown down; path 15 miles long.
Clyburn, S. C.	1	P. m.		2	5,000	Tornado	Property damaged.
Wimmsboro, S. C.	1	P. m.			10,000	Thunderstorm	Buildings and other property damaged.
Columbia, S. C., and vicinity.	1				500	do.	Damage to windows and signs.
New York State, western and northern portions.	2-3			3		Heavy snowfall and high winds.	Snow accompanied by high winds caused blizzardlike conditions in the area south of Buffalo with drifts about 6 feet deep. Bus and train service delayed, travelers marooned and most rural schools closed. Wind, reaching a maximum velocity of 61 miles per hour at Buffalo, caused the washing out of a pier at Niagara Falls resulting in an estimated damage of \$5,500. In northern New York, with from 3 to 4 feet of snow on the ground, the wind blocked most traffic. 2,000 persons were stranded in Lewis County and 500 in Massena, Saint Lawrence County. 2 men died from exposure and 1 from overexertion; Communication and power lines disrupted. Several buildings demolished by these storms.
Port Acres and the Groves, Tex.	5	10:40-11:30 a. m.	150	0	25,000	2 Tornadoes	Numerous accidents caused by slippery roads.
Harrisburg, Pa., vicinity of.	16				2,700	Ice	2 homes and a number of outbuildings demolished; 4 persons injured.
Maringouin, La., vicinity of.	22	9:45 a. m.	100	2	7,500	Tornado	A well-defined funnel cloud observed.
Welty, Okla.	25	11 a. m.	100	0	1,000	do.	10 small houses and buildings demolished and about 25 others damaged; 5 persons injured.
Dio-Merritt section, Miss.	26	11:20 a. m.	200	0	100,000	do.	3 houses completely destroyed and a number of other houses and structures damaged. No estimate of damage available.
Cookville, Tex.	26	4:45 p. m.		0		do.	Many buildings damaged.
Nacogdoches, Tex., and vicinity.	26	8 p. m.	1,320	0	4,000	do.	Property damaged; path 10 miles long.
Nacogdoches-Appleby district, Tex.	26	8:17 p. m.	100	5	100,000	do.	
New York State, from Sullivan and Orange Counties, northward to the Canadian Border.	29-30			1		Glaze	There was some formation of glaze exceeding 6 inches in diameter on power and communication cables. The damage will run into millions of dollars. In Saint Lawrence and Franklin Counties it was estimated that 9,600 homes were without electricity. Sugar maples, orchards, ornamental trees and shrubs were badly broken and buildings were damaged by falling limbs. At Gloversville a man was killed by a falling ice-weighted tree limb.

## SOLAR RADIATION AND SUNSPOT DATA FOR DECEMBER 1942

[Solar Radiation Investigations Section, I. F. HAND in charge]

## SOLAR RADIATION OBSERVATIONS

Explanations of the tables and references to descriptions of instruments, stations, and methods of observation, and to summaries of data, are given in the January 1942 REVIEW, page 20. A list of the pyrheliometric stations is also included in this month's report.

## PYRHELIOMETRIC STATIONS

Station	Under direction of—	N. latitude	W. longitude	Altitude Feet	Instruments		Remarks
					Receiver	Recorder	
San Juan <sup>1</sup>	Columbia School of Tropical Medicine.	18 28	66 06	85	Photo-electric cell.	Modified potentiometer.	Good exposure on narrow peninsula, but some interference from salt spray. Cooperation with Columbia University. Ultraviolet measurements only.
New Orleans	Tulane University	29 56	90 07	100	Eppler	L. & N. potentiometer.	Good exposure; considerable cloudiness.
La Jolla	Scripps Institute of Oceanography.	32 50	117 15	85	do	Engelhard	Splendid exposure a few yards inland from Pacific Ocean. Early morning fogs prevail during part of year.
Riverside	University of California.	33 58	117 28	1,051	do	do	Excellent exposure in midst of citrus fruit region.
Albuquerque <sup>2</sup>	U. S. Weather Bureau.	35 05	106 30	5,314	do	L. & N. potentiometer.	At airport; dust at times. Station has highest elevation of this group.
Nashville	do	36 07	86 41	602	do	do	At airport with good exposure, but records vitiated by soft-coal smoke in winter.
Fresno	do	36 43	119 49	330	do	do	Good exposure at airport northern edge of city. The San Joaquin Valley has an exceedingly high percentage of sunshine.
Davis	University of California.	38 32	121 45	106	do	do	Excellent exposure; little atmospheric contamination.
Washington	U. S. Weather Bureau.	38 56	77 05	397	do	do	Good exposure on second highest point in District of Columbia. 5½ miles northwest of United States Capitol. Some vitiation from city smoke.
Columbus	Ohio State University.	39 58	83 00	810	do	do	Considerable smokiness with light winds.
New York	U. S. Weather Bureau.	40 46	73 58	180	do	Engelhard	Fair exposure at Central Park Meteorological Observatory. Values vitiated by large city atmospheric contamination.
State College	State College, Pa.	40 48	77 52	1,280	do	L. & N. potentiometer.	Splendid exposure in farming country.
Lincoln <sup>3</sup>	U. S. Weather Bureau.	40 50	96 45	1,225	do	do	Results very representative of the Great Plains area. Some dust.
Newport <sup>4</sup>	Eppler Laboratory.	41 30	71 19	52	do	do	Excellent location.
Put-in-Bay	Franz Theodore Stone Biological Laboratory.	41 40	82 50	618	do	do	Almost no smoke or dust contamination. On an island 22 miles from the mainland.
East Wareham	U. S. Bureau of Plant Industry in cooperation with Mass. Experiment Station.	41 46	70 40	50	do	do	Low ground; close to cranberry bogs and open water.
Chicago	U. S. Weather Bureau.	41 47	87 25	688	do	Engelhard	Good exposure on roof of Rosenwald Hall, University of Chicago. A great deal of smoke.
Blue Hill <sup>4</sup>	Harvard University	42 13	71 07	672	do	Engelhard and L. & N. potentiometer.	Excellent exposure on high ridge 10 miles south of Boston. With northerly component winds, some smoke contamination from Boston.
Cambridge	Massachusetts Institute of Technology.	42 22	71 06	31	do	L. & N. potentiometer.	Data used in studies of direct utilization of solar radiation for house heating under Cabot Fund.
Ithaca	Cornell University	42 27	76 29	953	do	do	Splendid site; data used by School of Agriculture.
Twin Falls	U. S. Bureau of Entomology and Plant Quarantine.	42 29	114 25	4,300	do	Engelhard	Good exposure on high plateau in rich farming country. Greatest elevation of any station here listed; exceeded only by Albuquerque where observations were recently begun.
East Lansing	U. S. Soil Conservation Service in cooperation with Michigan Agricultural Experiment Sta.	42 52	84 28	878	do	L. & N. potentiometer.	Very little atmospheric contamination on low ridge dividing two watersheds.
Madison <sup>4</sup>	U. S. Weather Bureau.	43 05	89 23	974	do	do	Excellent exposure, North Hall, University of Wisconsin. Rapid growth of city has added to atmospheric vitiation recently.
Friday Harbor	University of Washington	48 32	123 01	15	do	Engelhard	Good exposure 50 miles northwest of Seattle directly on ocean; considerable fog interference.
Fairbanks	University of Alaska	64 52	147 39	500	do	do	Most northerly station of this kind in the world. Very little contamination.

<sup>1</sup> Measurements from San Juan are of the ultraviolet below 0.3132 $\mu$  only at present. The pyrheliometer for the measurement of total solar and sky radiation was broken and it is hoped that this type of measurement will be resumed as soon as repairs may be made.

<sup>2</sup> Measurements of total solar and sky radiation have been discontinued at Albuquerque until such time as a replacement potentiometer may be obtained. Normal incidence readings are made at this station by means of an Eppler normal-incidence pyrheliometer recording on a Leeds and Northrup potentiometer.

<sup>3</sup> Besides the standard Eppler pyrheliometer and Leeds and Northrup potentiometer, the laboratory has precision equipment for the standardization of pyrheliometers.

<sup>4</sup> Station also equipped with normal incidence pyrheliometers recording on Leeds and Northrup potentiometers. At Blue Hill several other types of solar observations also are made.



TABLE 1.—Solar radiation intensities during January 1943

[Gram-calories per minute per square centimeter of normal surface]

## MADISON, WIS.

Date	Sun's zenith distance											Local mean solar time
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.	
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
Jan. 4	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.	
5	1.75	1.01	1.10	1.25	1.67	1.25	1.15	1.25	1.30	1.45		
6	.64	.74	.86	1.14	1.52	1.15	1.15	1.35	1.40	1.55		
7	2.16					.94				2.49		
8	2.74					1.28				3.15		
9	1.02	.84	.95	1.15	1.67	1.16				1.12		
10	.74	.84	1.02	1.14	1.49					1.17		
11	.56	1.11	1.22	1.37	1.62	1.34				.53		
12	2.36	.76	.88	1.01	1.33					1.75		
13	.69			1.21	1.65	1.23				.48		
14	.46		1.07	1.22	1.58					1.96		
15	.81	.59	.84	1.03	1.60	1.10				1.30		
16	.86		.71	.91	1.53					2.49		
Means		.84	.96	1.14	1.57	1.18						
Departures		-.09	-.08	-.06	-.03	+.03						

## LINCOLN, NEBR.

Jan. 4	1.17	0.83	1.00				0.89	0.62	2.26
5	1.37	.49	.75	0.96			1.00	.85	3.30
6	1.37			1.07					1.75
7	3.99			1.07			1.22	1.09	3.63
8	3.02			1.22			1.20		3.15
9	2.06	1.00	1.09	1.24					2.26
10	1.52			1.11					3.86
11	4.57	1.00	1.11	1.20			1.18	1.04	4.57

TABLE 1.—Solar radiation intensities during January 1943—Con.

## LINCOLN, NEBR.—Continued

Date	Sun's zenith distance										Local mean solar time	
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		1:30 p. m.
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0		5.0
Jan. 19	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.	
22	2.62	.75		1.18	cal.	cal.	cal.	1.16	1.07	.92	.74	
25	.56		1.04	1.20	1.37		1.37	1.20	1.09	1.04	4.19	
26	.97	.89	1.02	1.18	1.35		1.35	1.18	1.05	.92	1.75	
27	1.68	.85	.94	1.13	1.31						2.26	
30	2.06	.77	.89	1.04							2.26	
Means		.84	.98	1.13	1.34	(1.36)	1.16	1.01	.90			
Departures		-.08	-.07	-.07	-.05		-.05	-.03	-.04	-.03		

## BLUE HILL, MASS.

Jan. 1	3.7	0.79	0.91	1.00							4.4
2	2.0	1.01	1.11	1.23	1.37			1.30	1.15		1.8
3	2.9	1.01	1.10	1.22	1.33			1.23	1.08	0.99	2.6
4	1.1	1.06	1.17	1.30	1.41			1.26	1.16	1.06	1.7
5	2.0	.97	1.07	1.17	1.34			1.21	1.07	.98	2.0
6	1.7	.68	.88	1.12	1.32			1.19	1.07	.96	1.8
7	1.2								.89	.85	2.1
8	1.8	1.00	1.10	1.24							1.9
9	2.0	.83	.92	1.06							2.4
10	1.3	1.06	1.10	1.25							1.7
11	.7							1.10			1.2
Means		.93	1.04	1.18	1.35			1.24	1.07	.97	
Departures		-.02	.00	+.03	+.03			+.05	+.03	+.04	

\*Extrapolated

TABLE 2.—Daily totals and weekly means of solar radiation (direct+diffuse) received on a horizontal surface

[Gram-calories per square centimeter]

Date	Wash- ington	Mad- ison	Lin- coln	New York	East Lans- ing	Cam- bridge	Fair- banks	Nash- ville	Twin Falls	New Or- leans	River- side	Blue Hill	Ithaca	New- port	State College	Put-in- Bay	East Ware- ham	Davis, Calif.
Jan. 1 1943	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.		
1	62	104	125	44	67	91		205	68		271	110	25	83	17	43	112	50
2	264	72	10	141	56	179		162	156		273	169	93	175	40	26	182	213
3	59	35	211	153	33	211		133	187		293	170	112	230	28	12	235	241
4	100	225	223	89	181	18		141	189		261	30	71	24	102	200	24	152
5	234	202	219	188	158	204		227	91	380	284	167	111	216	107	119	216	254
6	176	66	15	180	87	219		87	149	204	310	191	226	235	192	108	248	265
7	114	114	182	189	92	212		24	113	32	314	188	164	229	53	53	243	251
Mean	136	117	141	136	96	162	0	140	136		286	172	115	170	77	80	180	204
Departure	-31	-12	-29	+18		+11	-7	0	-13		+39	+29	+14	+21	-25			
8	33	170	186	124	180	213		52	40	51	306	188	245	213	80	224	238	234
9	171	61	162	225	66	103		160	52	262	288	167	278	196	200	66	224	147
10	46	171	225	176	81	150		44	52		275	156	135	190	53	74	208	180
11	199	212	237	65	42	153		259	38		287	139	66	194	114	56	225	270
12	261	224	235	140	186	124		164	32	111	289	103	116	154	162	120	157	264
13	249	210	228	241	185	216		164	74	158	302	190	189	244	166	171	240	245
14	195	143	241	159	46	191		67	167	393	293	170	109	206	123	33	230	255
Mean	165	170	216	163	112	178	0	199	65	195	292	197	162	201	128	106	215	228
Departure	+12	+36	+36	+41		+24	-10	0	-88	-23	+45	+37	+55	+31	-5			
15	229	114	196	147	152	192		242	181	359	286	145	116	204	129	169	205	250
16	187	124	44	96	85	40		199	180	272	97	42	163	90	66	90	83	299
17		177	160	32	150	26		162	200	140	186	16	50	20	13	68	18	302
18		57	135	99	16	115		40	236	218	305	13	25	14	58	38	21	308
19	157	269	276	35	243			287	87	418	328	27	105	34	87	152	35	137
20	252	162	230	262	268			292	60	374	187	183	263	267	253	259	265	37
21	196	157	180	98	63			238	162	364	47	168	145	145	65	65	198	41
Mean	190	167	171	98	154	68	0	269	153	366	265	165	124	111	96	120	118	196
Departure	+22	+14	-16	-25		-38	-14	-3	-14	+66	-79	-53	+8	-65	-22			
22	202	215	204	182	203	170		160	200	287	23	136	233	251	184	163	140	105
23	154	227	141	40	111	138		186	140	302		142	58	184	40	56	194	243
24	189	35	134	142	66	202		284	238		206	162	169	219	163	108	229	212
25	172	255	257	106	113	38		50	213	248	163	45	61	64	94	34	60	60
26	30	252	263	27	248	29		30	155	44	123	20	113	30	67	116	23	80
27	70	246	243	138	295	114		204	92	130	338	85	127	97	216	290	84	283
28	44	262	226	27	294	34		82	196	50	236	31	59	35	63	219	38	244
Mean	123	213	210	94	190	164	5	142	176	177	151	110	108	126	118	140	110	175
Departure	-50	+31	-12	-64		-44	-19	-32	-5	-43	-66	-68	-33	-48	-6			

## ACCUMULATED DEPARTURES ON JANUARY 28, 1943

-329	+483	-147	-210		-469	-350	-245	-840	0	-427	-385	+308	-427	-406				
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POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR  
JANUARY 1943

[Communicated by Capt. J. F. Hellweg, U. S. N. (Ret.), Superintendent, U. S. Naval Observatory.] All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of Sun's hemisphere. For each day, under longitude, latitude, area of spot or group, and spot count, are included assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups, and total spot count.

Date	East- stand- ard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate qual- ity	Observatory
			Dif- fer- ence in longi- tude	Longi- tude	Lat- itude	Dis- tance from cen- ter of disk				
1943 Jan. 1...	<i>h m</i> 11 26	7536	° +46	° 151 (105)	° +5 (-3)	° 47	145 145	1 1	G	Mt. Wilson.
2...	11 3	7536	+60	152 (92)	+5 (-3)	60	145 145	1 1	F	U. S. Naval.
3...	10 40	7536	+73	152 (79)	+5 (-3)	73	121 121	1 1	F	Mt. Wilson.
4...	11 53	7536	+87	152 (65)	+5 (-3)	87	97 97	1 1	F	Do.
5...	10 48				No spots					U. S. Naval.
6...	12 8	7538	-79	319 (38)	-4 (-4)	79	97 97	1 1	F	Do.
7...	10 44	7538	-66	320 (26)	-4 (-4)	66	145 145	2 2	P	Mt. Wilson.
8...	10 54	7538	-52	321 (13)	-4 (-4)	52	145 145	4 4	P	Do.
9...	11 14	7538 7538	-43 -38	316 321 (359)	-5 -5 (-4)	43 38	48 194 242	3 5 8	F	U. S. Naval.
10...	11 16	7538 7538	-29 -25	317 321 (346)	-5 -5 (-4)	29 25	97 145 242	12 5 17	F	Mt. Wilson.
11...	12 27	7538 7538	-18 -11	314 321 (332)	-5 -5 (-4)	18 11	48 97 145	8 11 19	G	U. S. Naval.
12...	10 28	7538 7538	-5 +3	315 323 (320)	-5 -5 (-4)	5 3	24 73 97	1 6 7	F	Do.
13...	10 55	7538 7538 7539	+9 +18 +70	316 325 17 (307)	-5 -5 -2 (-4)	9 18 70	24 48 48 120	2 4 3 9	G	Do.
14...	10 49	7538 7538	+23 +32	317 326 (294)	-5 -5 (-4)	23 32	24 36 60	3 3 6	F	Mt. Wilson.
15...	10 38	7538	+47	328 (281)	-5 (-5)	47	12 12	1 1	F	Do.
16...	10 22			No spots					F	U. S. Naval.
17...	11 38	(*)	+65	319 (254)	-5 (-5)	65	48 48	2 2	F	Do.
18...	13 31	7541 7541	-67 -60	173 180 (240)	-7 -5 (-5)	67 60	48 24 72	1 3 4	F	Do.
19...	12 2	7542 7541 7541	-75 -53 -48	152 174 179 (227)	+7 -7 -5 (-5)	76 53 48	48 97 48 193	1 5 8 14	F	Do.

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR  
JANUARY 1943—Continued

Date	East- ern stand- ard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate qual- ity	Observatory
			Dif- fer- ence in longi- tude	Longi- tude	Lat- itude	Dis- tance from cen- ter of disk				
1943	h m		°	°	°	°				
20...	11 1	7542	-62	153	+7	63	48	1	F	Do.
		7541	-40	175	-7	40	97	4		
		7541	-35	180	-5	35	48	7		
		(*)	-22	193	-3	23	12	3		
		(*)	0	215	-3	2	18	6		
			(215)	(-5)	-----		223	21		
21...	10 40	(*)	-80	122	+15	80	97	1	G	Do.
		(*)	-71	131	+12	73	145	2		
		7542	-48	154	+7	50	48	1		
		7541	-28	174	-8	28	97	8		
			(202)	(-5)	-----		387	12		
22...	11 21	(*)	-57	131	+12	60	97	1	F	Do.
		7542	-35	153	+7	38	48	1		
		7541	-14	174	-8	14	97	8		
			(188)	(-5)	-----		242	10		
23...	11 5	(*)	-43	132	+12	47	73	1	F	Do.
		7542	-22	153	+7	25	48	1		
		7541	0	175	-8	3	21	2		
			(175)	(-5)	-----		145	4		
25...	12 17	(*)	-17	131	+11	22	73	1	G	Do.
		7542	+5	153	+7	12	48	5		
		7541	+26	174	+5	28	97	8		
			(148)	(-5)	-----		218	14		
27...	18 5	7543	+60	179	+6	61	97	1	G	Mt. Wilson.
			(119)	(-6)	-----		97	1		
28...	17 25	7543	+73	179	+5	74	73	1	VG	Do.
			(106)	(-6)	-----		73	1		

Mean daily area for 26 days=135

\* Not numbered.

VG=very good; G=good; F=fair; P=poor.

PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR  
OCTOBER 1942

(Based on observations at Zurich. Data furnished through the courtesy of Prof. W. Brunner, Eidgen. Sternwarte, Zurich, Switzerland)

October 1942	Relative numbers	October 1942	Relative numbers	October 1942	Relative numbers
1.....	14	11.....	29	21.....	
2.....	17	12.....	32	22.....	*25
3.....	8	13.....	*9	23.....	*17
4.....	0	14.....	9	24.....	16
5.....	0	15.....	a 11	25.....	8
6.....	0	16.....	12	26.....	Ec 13
7.....	18	17.....	10	27.....	dd 31
8.....	17	18.....	*9	28.....	a 39
9.....	27	19.....	*17	29.....	37
10.....	Wed 32	20.....	19	30.....	51
				31.....	44

Mean, 30 days=19.0

\* Observed at Locarno.

a= Passage of an average-sized group through the central meridian.

b= Passage of a large group through the central meridian.

c= New formation of a group developing into a middle-sized or large center of activity: E, on the eastern part of the sun's disk; W, on the western part; M, in the central-circle zone.

d= Entrance of a large or average-sized center of activity on the east limb.



## DESCRIPTION OF CHARTS

Chart I. *Temperature departures and wind roses for selected stations.*—Based on data contained in the table, "Climatological Data for Weather Bureau Stations", this chart presents the departures of the monthly mean surface temperatures from the monthly normals. The shaded portions of the chart indicate areas of positive departures and unshaded portions indicate areas of negative departures. Generalized lines connect places having approximately equal departures of like sign. Charts of monthly surface-temperature departures in the United States were first published in the MONTHLY WEATHER REVIEW for July 1909, and continued thereafter, but smaller charts appear in W. B. *Bulletin U* for 1873 to June 1909, inclusive. An innovation has been made in this chart, beginning January 1939. The selected wind rose data formerly published as chart VII have been transferred to this chart. The wind roses are based on hourly percentages by months for 28 selected Weather Bureau stations.

Chart II. *Tracks of centers of ANTICYCLONES;* and

Chart III. *Tracks of centers of CYCLONES.*—The roman numerals show the chronological order of the centers. The figures within the circles show the days of the month, the location indicated being that at 7:30 a. m., 75th meridian time. Within each circle is also an entry of the last three figures of the highest barometric reading (chart II) or the lowest readings (chart III) reported at or near the center at that time, in both cases as reduced to sea level and standard gravity. The intermediate 7:30 p. m. locations are indicated by dots. The inset map on chart II shows the departure of monthly mean pressure from normal and the inset on chart III shows the change in mean pressure from the preceding month.

The use of a new base map for charts II and III began with the January 1930 issue. Charts IV, V, and VI are based on data found in the table, "Climatological Data for Weather Bureau Stations", with chart V also including representative cooperative stations.

Chart IV. *Percentage of clear sky between sunrise and sunset.*—The average cloudiness at each regular Weather Bureau station is determined by numerous personal observations between sunrise and sunset. The difference between the observed cloudiness and 100 is assumed to represent the percentage of clear sky, and the values thus

obtained are the basis of this chart. The chart does not relate to the night hours.

Chart V. *Total precipitation.*—The scales of shading with appropriate lines show the distribution of the monthly precipitation according to reports from both regular and cooperative observers. The inset on this chart shows the departure of the monthly totals from the corresponding normals, as indicated by the reports from the regular stations.

Chart VI. *Isobars at sea level and isotherms at surface, prevailing winds.*—The pressures have been reduced to sea level and standard gravity by the method described by Prof. Frank H. Bigelow in the REVIEW for January 1902, 30: 13-16. The pressures have also been reduced to the mean of the 24 hours by the application of a suitable correction to the mean of 7:30 a. m. and 7:30 p. m. readings at stations taking two observations daily, and to the 7:30 a. m. or the 7:30 p. m. observation at stations taking but a single observation.

The diurnal corrections so applied, except for stations established since 1901, will be found in the Annual Report of the Chief of the Weather Bureau, 1900-1901, volume 2, table 27, pages 140-164.

The sea-level temperatures are now omitted and average surface temperatures substituted. The isotherms cannot be drawn in such detail as might be desired, for data from only the regular Weather Bureau stations are used.

The prevailing wind directions are determined from hourly observations at almost all the stations. A few stations determine their prevailing directions from the daily or twice-daily observations only.

Chart VII. *Total snowfall.*—This is based on the reports from regular and cooperative observers and shows the depth in inches of the snowfall during the month. In general, the depth is shown by lines connecting places of equal snowfall, but in special cases figures also are given. This chart is published only when the snowfall is sufficiently extensive to justify its preparation. The inset on this chart, when included, shows the depth of snow on the ground at 7:30 p. m. of the Monday nearest the end of the month and is a copy of the snow chart appearing in the Snow and Ice Bulletin for that week. Generally, the publication of the Weekly Snow and Ice Bulletin commences about the middle of December and continues to near the close of March.





Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, January 1943

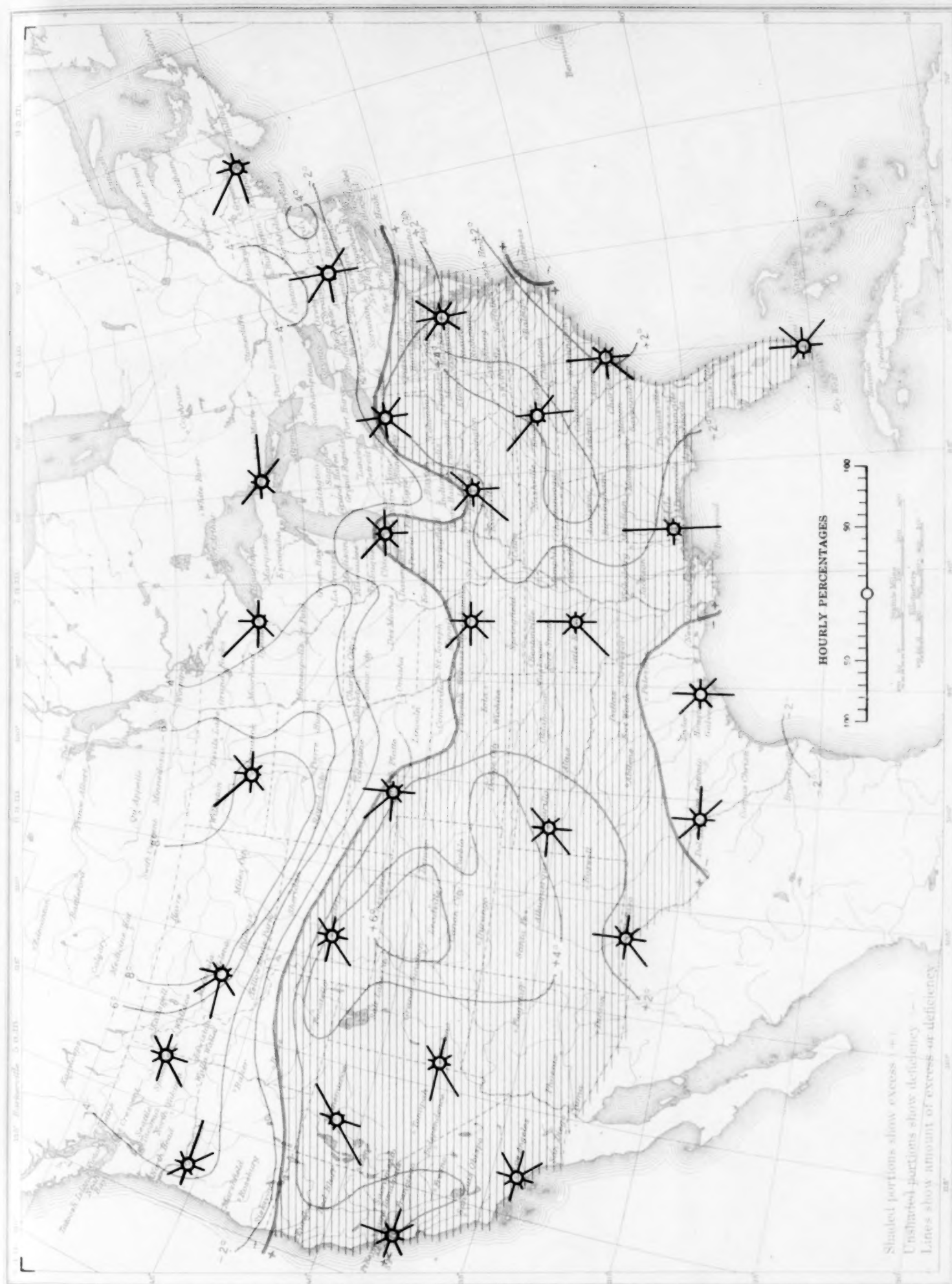
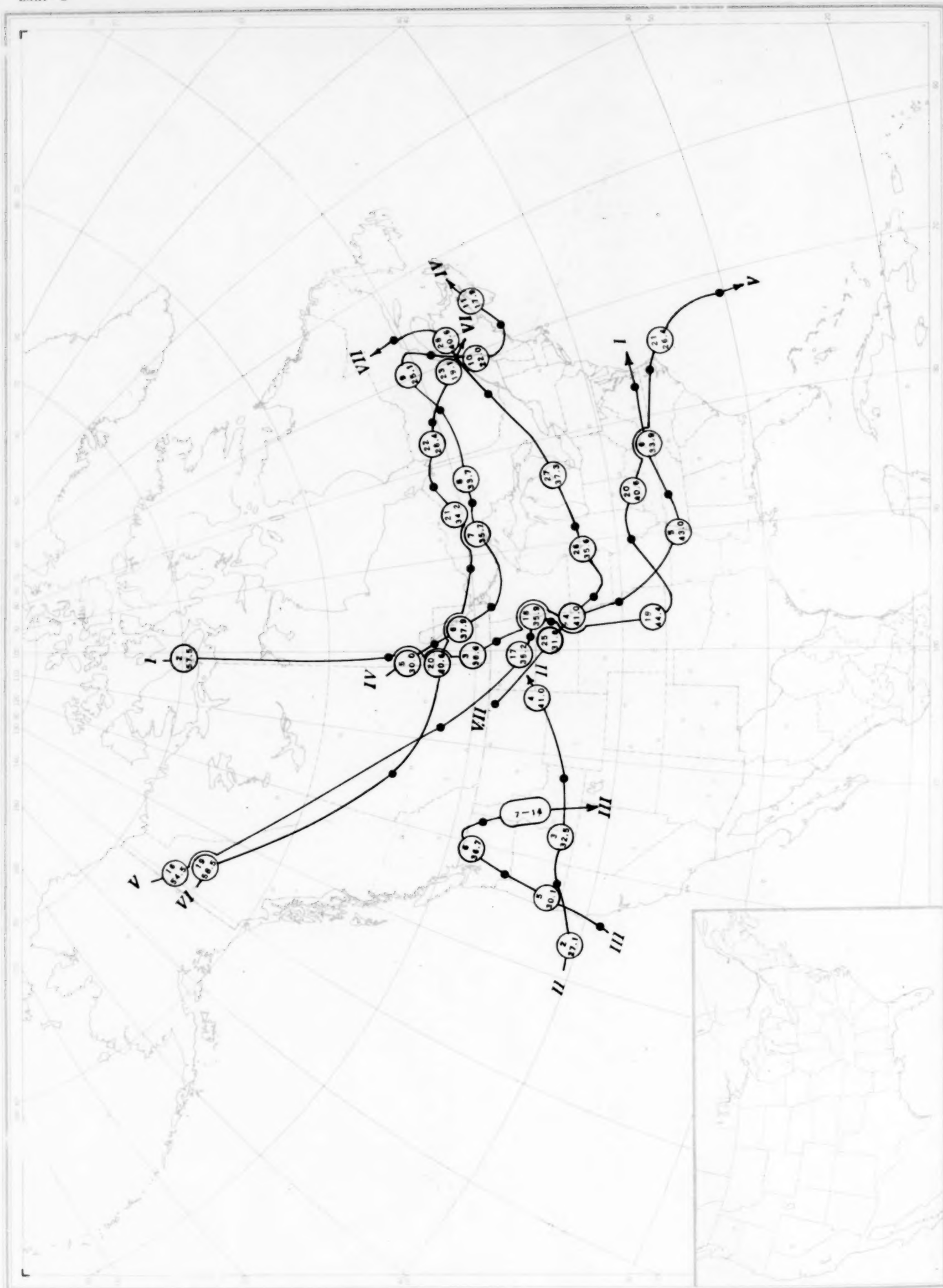


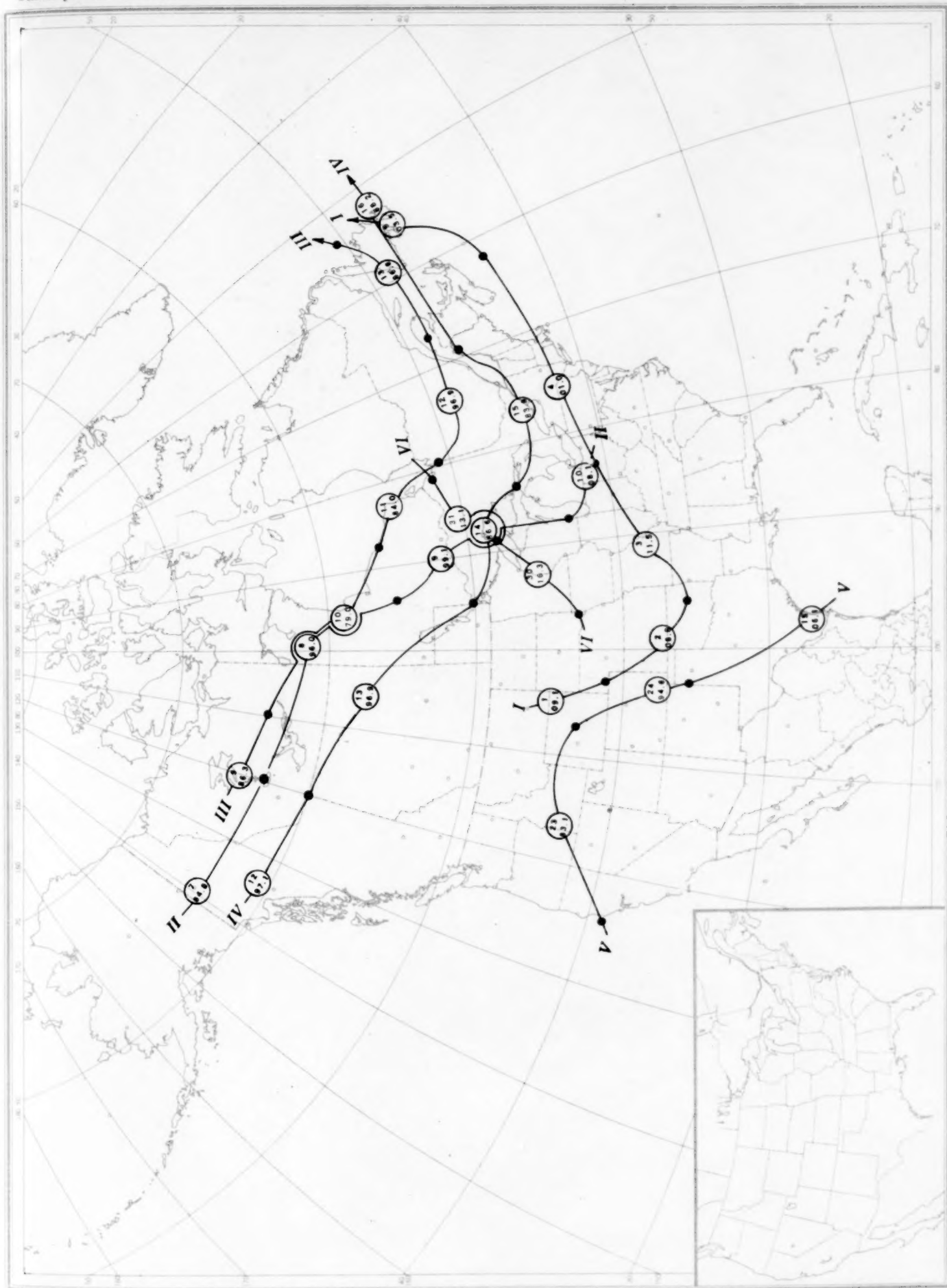
Chart II. Tracks of Centers of Anticyclones, January 1943.



Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (76th meridian time)



Chart III. Tracks of Centers of Cyclones, January 1943.



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 7:30 p. m. (75th meridian time).

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, January 1943

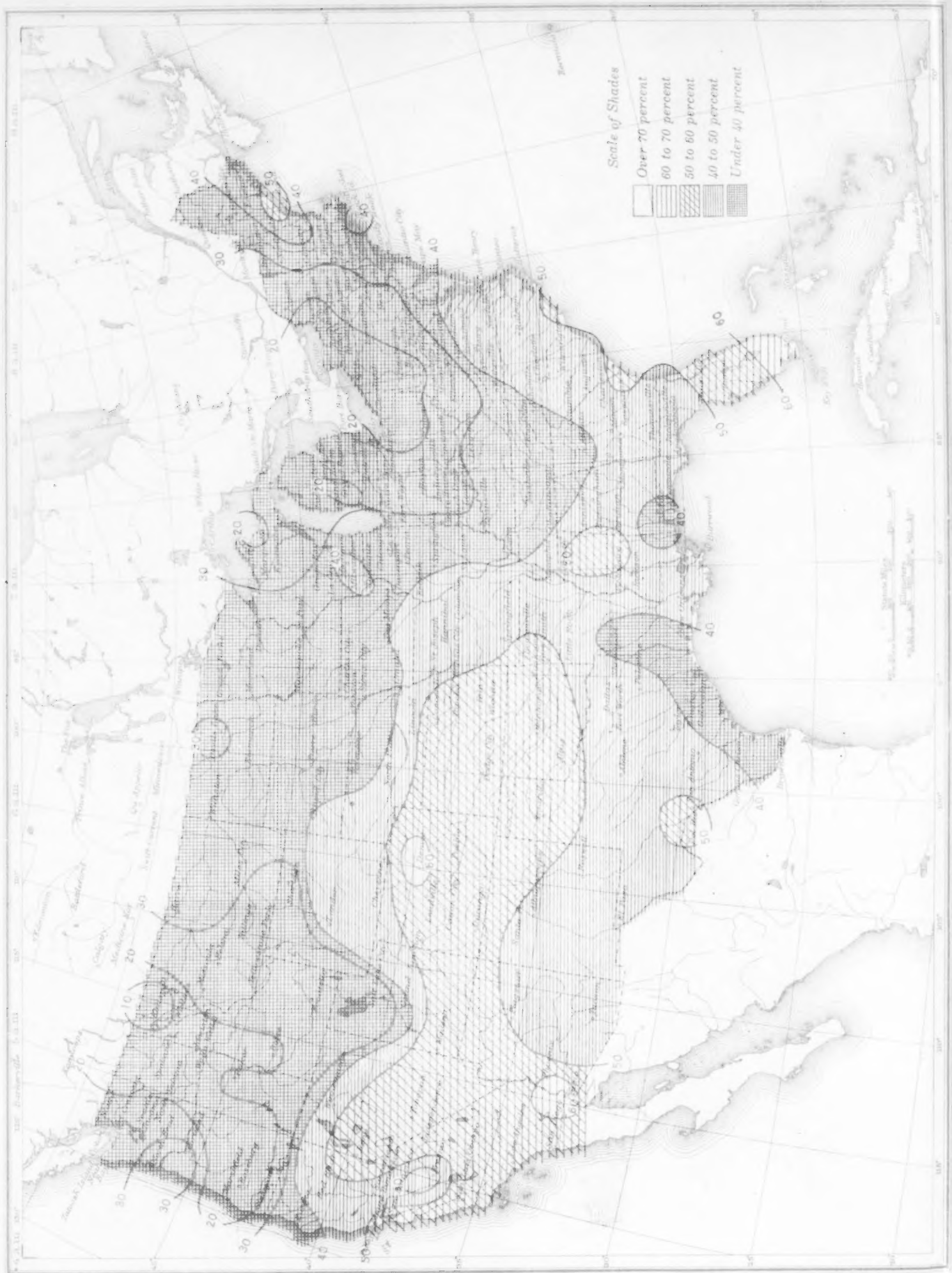




Chart V. Total Precipitation, Inches, January 1943. (Inset) Departure from Normal

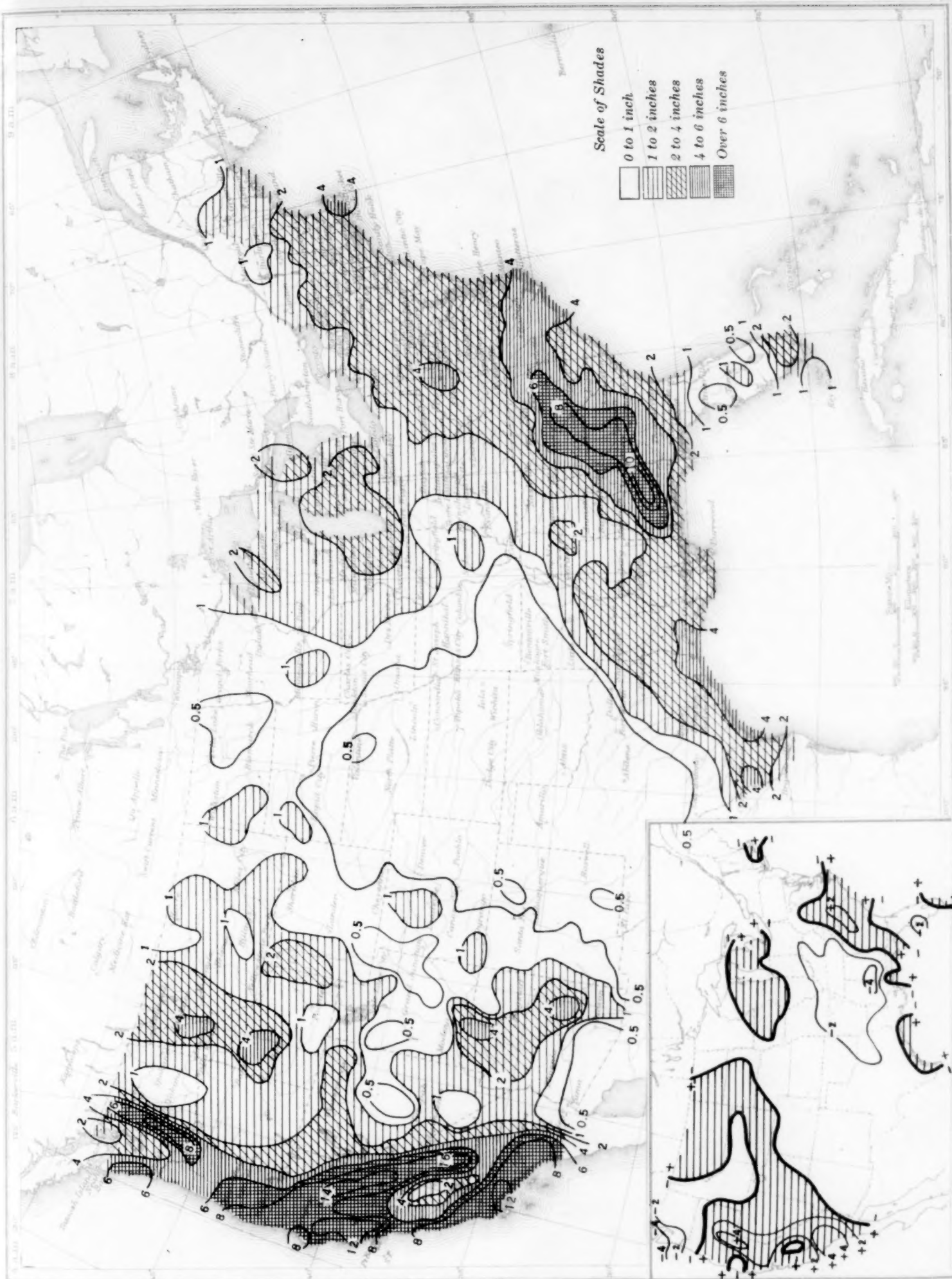


Chart VI. Isotherms at Surface; Prevailing Winds, January 1943

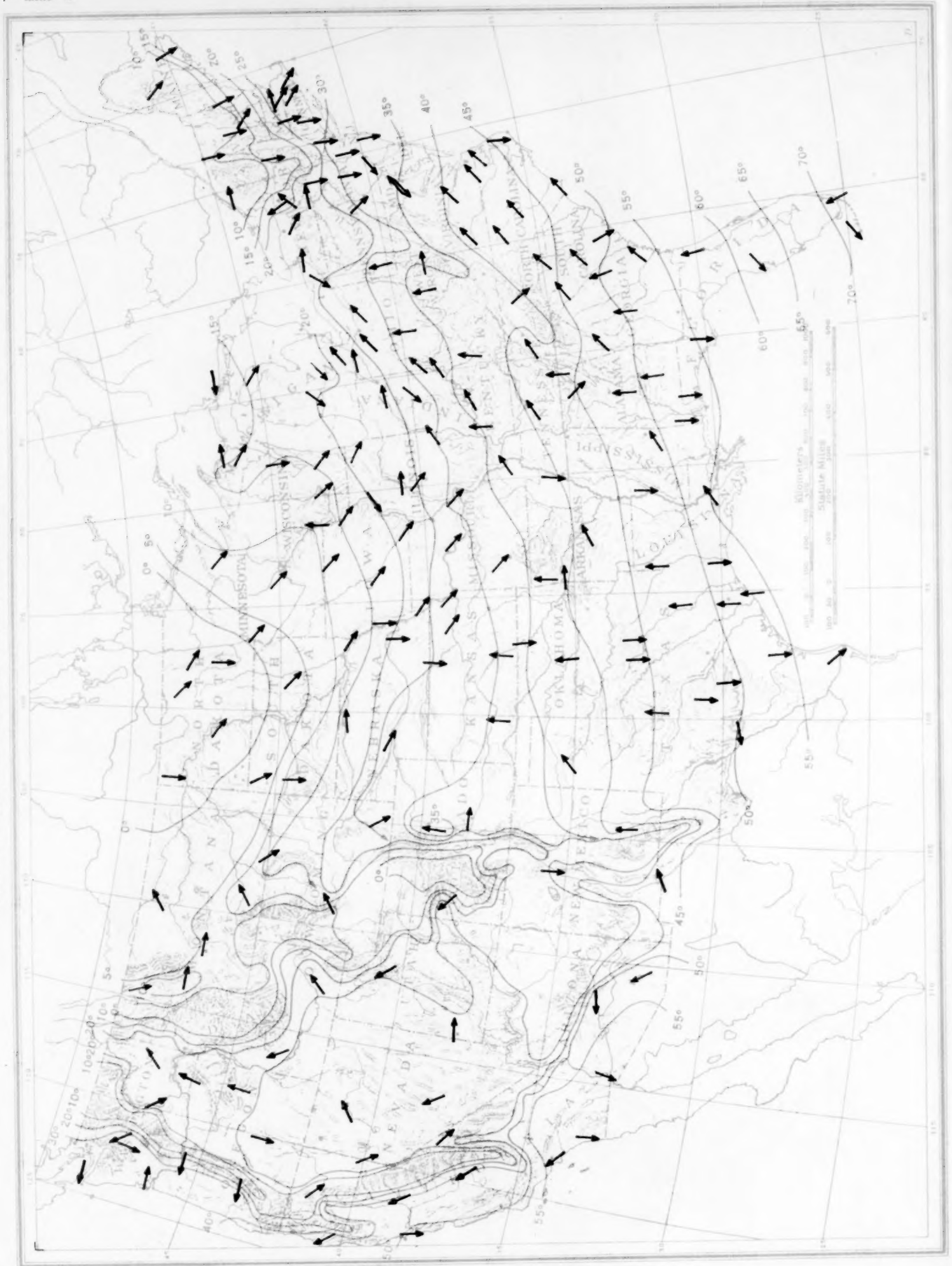


Chart VII. Total Snowfall, Inches, January 1943. (Inset) Depth of Snow on the Ground at 7:30 p. m., Monday, January 25, 1943



Chart VII. Total Snowfall, Inches, January 1943. (Inset) Depth of Snow on the Ground at 7:30 p. m., Monday, January 25, 1943

